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Under the General Editorial Charge of

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University Medical School

Volume VI

Pharmacology and Therapeutics

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INTRODUCTION.

An ideal review on the progress of therapeutics should represent the cream of current medical literature, so far as the interests of the medical practitioner are concerned. Conscious that his efforts have fallen far below the ideal aimed at, the editor hopes to have succeeded, at least in some degree, in skimming from the vast amount of material at hand much that might be of practical value. Much had to be passed unnoticed that is of importance to the research worker as well as of interest to the practitioner of medicine, in order to enable the editor to introduce, in practical detail, that which he considers of paramount importance to him who is to use the measure described, namely, the technique of administration. For no physician should undertake a therapeutic measure with which he is not familiar, no matter how simple it may appear, until he has acquainted himself with all the practical details.

To Improve Therapeutic Management, has been the editor's chief aim throughout. On the importance of this he can not do better than to quote Rufus Southworth,[1] who says on this topic: "The subject of therapeutic management is of special interest and also particularly timely because there has arisen a group in the medical profession who would decry the need of study of the application of therapeutic agents on the ground that, with a thorough knowledge of pathology, pharmacology, and diagnosis, the treatment may be left to be evolved from the inner consciousness of the practitioner. They would have us believe that we may go forth to the battle between life and death, armed with little more equipment than a microscope and a few test-tubes. This would make therapy almost as simple a matter as in the day of the 'one-horse chaise' when the doctor tied a string around the patient's body; and, if

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(1) Ohio State Med. Jour., Dec. 1, 1918.

the pain was above the string gave an emetic, and if below the string a cathartic. We who are engaged in general practice must be on the alert to find and employ new methods and new agencies in our battle with disease, or new and more effective applications of old principles."

The study of pharmacology and therapeutics ought to be the common meeting ground for specialist as well as general practioner, the laboratory man as well as the clinician. For, while the specialist can contribute much that is of value to specialists in other lines as well as to the general practioner, the latter is capable of making observations that may be invaluable to the specialist. Hence, the editor has touched upon topics that might be considered more appropriate for some of the special sections of this series, in which indeed they will probably be taken up again in greater detail.

BERNARD FANTUS.

PHARMACOLOGY AND THERAPEUTICS.

GENERAL CONSIDERATIONS.

The Wise Choice of Therapeutic Measures. Under this heading, A. L. Benedict[2] says among other useful things: "Almost as dangerous as therapeutic nihilism, and indeed essentially of the same nature, is the tendency to limit treatment to the employment of powerful agents . . . There has arisen a class of physicians [and the majority of the teachers in our medical schools are of that class.—Ed.] whose treatment is limited to the use of sledge-hammer methods. That they get immediate results is undeniable, but in many instances the method is subject to the same criticism as that of the too-ready operator. The patient may not survive the treatment; he may survive, but in a damaged state; he may have suffered unnecessary positive effects; and means of relief may have been omitted . . . There are conditions when to temporize with small doses and milder measures would be cruel as well as foolish . . . We are prone to forget that pain, even discomfort, physical or mental, is an important factor in disturbing physiologic functions, and in determining organic lesions . . . even such minor shocks as unpleasant and disturbing emotions produce actual lesions, perhaps permanent, in the Purkinje cells. Hence a ridiculously minor drug, such as helonias, viburnam, dioscorea, a palatable and esthetic preparation, a satisfactory tasteless substitute for a bitter drug, or an efficient means of concealing a bad taste, may in a long series of cases mean a difference in mortality statistics . . . The

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(2) Therap. Gaz., February, 1918.

wonderful development of scientific medicine has thrown into the background the many minor helps of the old-time doctor and the natural and proper desire of the patient for comfort as well as scientific attention to his ailment. We have not progressed far enough to abandon minor therapeutic measures and the skill of our fathers in medicine in using them.

Among the examples of useful minor drug actions, Benedict mentions the following:

"An atomizer filled with mineral oil containing 1 per cent. each of camphor and menthol, or a pledget of cotton moistened with a drop of oil of peppermint, and inserted into one nostril and then the other, will afford great relief in coryza. . . . Menthol is a valuable drug in determining better circulation to mucous membranes, reducing bacterial growth, and increasing secretion. It should not be used in conditions of irritation, but camphor may be substituted.

"With mineral oil, two or three tablespoonfuls daily, and enough phenolphthalein or cascara to reënforce it by direct stimulation of peristalsis, apparently even cases of hopeless constipation may gradually be cured, and, if not, kept in a state of comfort indefinitely.

"A very excellent drug is soap, neutral, unperfumed, without the addition of antiseptics. At any rate, in gastric lavage, colonic lavage, removal of masses from the rectum or the ear, for oral asepsis, plain soap is about as satisfactory an agent as we possess.

"In the ordinary grade of cystitis, with no allusion to severe infection, with or without calculi, cancer, angiomata, etc., it is almost never necessary to resort to irrigation. Ammonium benzoate will gradually act as an antiseptic, and, in fact, sometimes acts more promptly than lavage.

"For stimulation in emergency, hot salt solution, 55° C. (131° F.), by bowel [This temperature seems excessive: 120° F. is practically as hot as can be borne.—Ed.], is the most efficient means at our disposal and much more efficient and immediate in its action than saline solution by hypodermoclysis. In hepatic torpor an afternoon devoted to drinking very hot water, with a little fruit juice or jelly added, taking 100 mils. at a time, and 1 to 2 liters in all, virtually accomplishes a hepatic lavage. The kidneys are also stimulated and considerable elimination of toxic matter can be accomplished speedily. Hot water half an hour before meals or late at night also accomplishes much in various gastric conditions, but should not be used indiscriminately. Mucus, stagnation, and failure of secretion are the three principal indications. For the last, small additions of ammonia or sodium bicarbonate are indicated, before, not after, meals."

[If every busy general practitioner would publish once or twice in his life some useful therapeutic fact that, in his opinion, is not sufficiently generally known and that he has established beyond the possibility of any doubt, what a gold mine of practical information would accumulate!—Ed.]

WAR TIME PRESCRIBING.

Conservation of Drugs. The sugar shortage prevailing at this time makes is desirable that physicians curtail, as much as possible, the prescribing of vehicles containing sugar. Nevertheless, this should not be done to the extent of interfering with the palatability of medicaments. It has been suggested that glucose be used instead of sugar. Inasmuch as glucose is only about one-third as sweet as an equivalent amount of syrup made from cane sugar, it is not a very satisfactory sweetening agent. Saccharin might, in some cases, be used to advantage for sweetening purposes. It is certainly harmless when used in moderate amounts. This substance is official under the name of *Benzosulphinidum*, it is about 500 times sweeter than sugar, and dissolves in about 300 parts of water, much more readily in the presence of alkali. It requires only 30 parts of alcohol for solution.

Glycerine has become very expensive, and it should be preserved, so far as possible, for the manufacture of ammunition. Hence, we should exclude glycerine from all prescriptions, unless it be essential in their composition.

The price of alcohol is also much higher than it was. This would make it desirable to prescribe extracts instead of fluidextracts and tinctures, whenever therapeutic efficiency is not sacrificed thereby, as would be, for instance, in case of digitalis, the extract of which is so unsatisfactory that it was deleted from the new pharmacopoeia. The use of fresh infusions and decoctions might be worth consideration in some instances.

Owing to the importance of lard as an article of human food, it might be worth while considering the use of petrolatum, or of petrolatum and lanolin, equal parts, as a substitute for edible fats for use as ointment bases.

Physicians might furthermore practice economy by not prescribing a larger quantity than will probably be consumed by the patient. It is a good rule not to prescribe more medicament than enough to last from one visit to the next. It is better to have a medicine refilled time and again than to have partly used bottles set aside.

Finally, it would also be in the interest of true economy if physicians would avoid prescribing drugs excepting where their use is actually and certainly necessary. While a few members of the medical profession, owing to drug nihilism, do not use as much medicament as would be best for their patients, it must be admitted that the rank and file use more drugs than are required. The placebo would be a good thing to apply the above laid down principles of economy in, including the one just mentioned, namely, avoiding prescribing it as much as possible.

Synthetic Drugs. Julius Stieglitz,[3] Professor of Chemistry, University of Chicago, who acts as chairman of the Subcommittee on Synthetic Drugs of the National Research Council, calls attention to the following facts:

The Federal Trade Commission has taken over the patents that gave monopoly for the manufacture and sale of various synthetics to German corporations and has issued licenses to American concerns for the manufacture of the products. [Those licensed to manufacture these are required to pay 5 per cent. of the gross

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(3) Jour. Amer. Med. Ass'n., Feb. 23, March 9, March 30, 1918.

sales to the alien property custodian to constitute a fund out of which the original patentees may derive some satisfaction.]

The commission has adopted certain new names for the licensed drugs; and physicians should use these names in literature, as well as in their prescriptions, adding, if they desire, the name of the proprietary brand in parenthesis. In this volume the recommendation of the Federal Trade Commission shall be carried out. The following substances are thus far manufactured under such licenses:

I. *Arsphenamine* is the official name for the drug introduced as salvarsan. It is a contraction of its scientific name. There are, at present, five independent sources of supply of this important drug, the quality of which is being controlled by the Public Health Service. The price of the supply to physicians has been fixed at a dollar and a half per ampule of 0.6 gram. Physicians are urged to report, with full detail, any cases of extortion, as well as inability to procure moderate supply, either directly to the Federal Trade Commission in Washington or to Professor Stieglitz.

II. *Neo-arsphenamine,* the new name under which neo-salvarsan is to be used, will shortly be manufactured in this country. Canadian, as well as French, products are already available. Professor Stieglitz, however, urges the use of arsphenamine, as it is more easily prepared pure on a large scale.

III. *Procaine* is the official name of the product introduced as novocaine. The name is a contraction of pro-cocaine, the drug being a substitute for cocaine. In view of the fact that in certain quarters the attitude is taken that the local anesthetic sold as procaine is not identical with that marketed as novocaine, Professor Stieglitz calls attention to the fact that the Federal Trade Commission has submitted the product of each firm licensed to the A. M. A. Chemical Laboratory to establish its chemical identity and purity and to Dr. R. A. Hatcher of Cornell University to determine that it was not unduly toxic.

The Journal of the National Association of Retail Druggists gives the following information regarding prices of this product: Novocaine sold for $52 a pound before the war, and $720 a pound since the war, under the German patent. The licensees agree to make this drug at a cost of $65 a pound and sell it at $95 a pound.

IV. *Barbital* is the name to be used for veronal. The word is a contraction of the chemical name, diethylbarbituric acid. This product is manufactured by the Abbott Laboratories of Chicago, and its quality has been found satisfactory. *Barbital-sodium,* the new name under which veronal-sodium or medinal should be prescribed, is available from Merck & Company, New York, as well as the Abbott Laboratories.

Before the war, veronal sold at $21.50 a pound, and since the declaration of war it has sold as high as $40 a pound. The licensees will produce it at a cost of $20 a pound and sell it at a profit of 15 per cent. (N. A. R. D. Journal).

Phenylbarbital, though not as yet officially recognized, will be the new name for the product introduced as luminal, which is of considerable use in the treatment of epilepsy. Merck & Company, 45 Park Place, New York, still have supplies of this drug and of its sodium salt, and the same firm is preparing to manufacture these products.

[Physicians interested in synthetic products that they consider essential are urged to communicate with Professor Stieglitz.—Ed.]

Use of Sodium Instead of Potassium Salt. An Editorial in the Journal of the American Medical Association[4] gives the following three reasons why sodium should be substituted for potassium: 1. By avoiding as much as possible the use of that which goes into ammunition or other war-time channels, especially if there is a scarcity, it will help win the war. 2. Therapeutically, the sodium salts are on the whole as good as the potassium salts, and in some instances better. 3. Sodium salts are much cheaper than the corresponding potassium compounds. The last statement is substantiated by the following comparison: The current price of potassium acetate is $2 a pound, and of sodium acetate, $0.62; potassium bicarbonate, $1.28, and sodium

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(4) Jour. Amer. Med. Ass'n., June 1, 1918.

bicarbonate, $0.05; potassium bromide, $1.93, and sodium bromide, less than half, $0.86 a pound; potassium chlorate, $0.86, and sodium chlorate, $0.57; potassium hydroxide, $3.50, and sodium hydroxide, $1; potassium iodide, $4.64, and sodium iodide, $5.15; potassium permanganate, $5.23, and sodium permanganate, $3.50. The higher price of sodium iodide is attributable to the fact that it has not been widely used. No doubt as soon as the demand has increased, sodium iodide will decline in price below that of potassium iodide.

ADMINISTRATION OF DRUGS IN GENERAL.

Large and Small Doses of Medicaments. Ch. Fiessinger[5] admits, among the faults in instruction in therapeutics, the failure to emphasize when large and when small doses of medicaments should be used. Thus all specific medicaments, that is those directed against the cause of disease, should be prescribed in large doses, *e. g.* quinine, mercury, sodium salicylate, antidiptheritic and antitetanic serum. When a mechanical action is aimed at, the dose should be large, as that of drastic purgatives in the dropsy of Bright's disease in a patient with a good heart, or that of bismuth subnitrate when used to soothe the mucosa of the stomach or the bowel.

On the other hand, in symptomatic therapy, or functional therapy (a term proposed by A. Robin), large doses are undesirable. Symptoms such as fever, diarrhea, cough, insomnia, arterial hypertension, etc., are merely defensive reactions. To antagonize the reactions with massive doses, is to fight the natural curative tendency of the organism, and possibly harm the patient. For example, digitalis or strophanthus, the author believes, should be given in the smallest dose that will produce and maintain the effect. Atropine, in doses of 1/10 to 2/10 mg., produces its desirable effects. The Germans may utilize doses of 3 mg. per day but their sympathetic system is hardened, their stomach tolerant, and they require strong medicament.

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(5) Bul. de l' acad. de méd., July 2, 1918.

The Latin races are differently constituted. We know that opium prolongs bronchitis by stopping cough. Hypnotics relieve the insomnia of the nervous; but aggravate their anxiety during the day. A dose of 0.5 gm. of chloral usually produces as sound sleep as a dose of 2.0 gm.

Candy Medication. Bernard Fantus[6] has added to the candy medication formulary, which contained over fifty formulae, a few additional ones by means of tolu and sugar coating. The author finds that, by coating each tiny particle of medicament with a thin layer of resin and then with sugar, an efficient covering of tastes is obtained. For details of the procedure, the reader who is interested must be referred to the original communication. It must suffice here to say that vegetable powders of moderately unpleasant tastes, such as digitalis, senna, or ipacac may be made absolutely palatable by means of the process, without more than a slight diminution in activity. The powder, thus coated, may be compressed into tablets or dispensed in powder form.

Fantus[7] has also undertaken a study of the double tungstates of alkaloids with a view of thereby increasing the number of medicaments suitable for administration in form of candy medication. He found that the silicotungstates of alkaloids were somewhat less bitter than the phosphotungstates; and that these tungstate radicles themselves were of sufficiently slight toxicity to make it possible to administer, in perfectly palatable form, alkaloids given in small dosage, such as strychnine or emetine, while for alkaloids given in large doses, *e. g.* quinine, the process is unsuitable.

Emetine siticotungstate might also possibly be of use in amebiasis, as it is much less likely to produce emesis, when given by stomach, than is a more soluble salt of emetine. How this combination compares in efficiency with emetine bismuth iodide and with emetinated fuller's earth (alcresta ipacac) remains for further studies to determine.

Liquid Paraffin as Vehicle. Lionel Jas. Picton[8] re

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(6) Jour. Amer. Pharm. Ass'n., March, 1918.
(7) Jour. of Lab. and Clin. Med., December, 1917.
(8) Brit. Med. Jour., Nov. 10, 1917.

ports that he has found a mixture of bismuth subnitrate and liquid paraffin of use in the treatment of gastric ulcer. "The bismuth salt may be rubbed up with ordinary liquid paraffin to form a smooth cream. It is taken thus without producing much nausea, and with increasing tolerance. The liquid paraffin is a good vehicle for bismuth, undoing its constipating effect. The patient is more comfortable, and less flatulent than when taking bismuth alone."

Apropos of this note, might be quoted the following from an article by A. L. Benedict[9]: "There are local applications, as to hemorrhoids, superficial ulcers of the skin or mucous membrane, and similar applications, swallowed to be sure, but just as truly local for the the stomach and possibly bowel, whose action is rendered much more comfortable if orthoform, hyoscyamus, belladonna, anesthesin, etc., are added, and if care is taken to choose an unirritating base, as a mineral oil."

Danger from the Use of Liquid Petrolatum as Vehicle for Hypodermic Injections. O. Jacobs and Faurefremiet[10] report seven cases of "petrolatomas" developing after injections of camphorated "oil," in which liquid petrolatum was employed as the solvent. The tumors developed five to nineteen months after the injection; and, though they did not modify general health, were sufficiently painful to interfere with the use of the limb and to require excision. The authors advise that the tumors be removed by extensive excision as for malignant growth, for they had recurrence in every instance, evidently due to particles of petrolatum left in the tissues.

[In view of the very general use of liquid petrolatum as vehicle for the intramuscular injection of mercuric salicylate, it seems strange that "petrolatomas" have not been more generally reported. Until we know more about the danger from such injections, it might be well to use an absorbable oil rather than a non-absorbable fluid for such injections.—ED.]

Insolubility of Soft Gelatin Capsules. That soft

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(9) Therap. Gaz., February, 1918.

(10) Rev. de chir., Paris, September-October, 1917, abstr. Jour. Amer. Med. Ass'n., July 20, 1918.

gelatin capsules are relatively insoluble in the stomach is shown by F. W. Dershimer[1] who gives the following:

SUMMARY OF RESULTS OF EXPERIMENTS.

Kind of Capsules.	Time Required to Release Contents When Placed in Acidified Pepsin Solution at Body Temperature.
Hard gelatin capsules	4 minutes
Soft gelatin capsules supplied by two different firms	3 hours 50 minutes
Soft gelatin capsules supplied by two other firms	Not released after 24 hours

This may explain the reason for the finding of the Malaya Board of the International Health Board, that soft gelatin capsules decreased the efficiency of treatment with oil of chenopodium by more than 20 per cent. The author concludes from his experiments that drugs should not be administered in soft gelatin capsules, as supplied at present, with any hope that they will act efficiently.

Direct Gastric Therapy. Martin E. Rehfuss[2] points out that, with the introduction of the fractional tube, we have fulfilled all the conditions for directly treating the stomach with a minimum of discomfort and a maximum amount of precision. By this technique, it is possible to evacuate completely all the material from the stomach and to apply to the mucous membrane a solution of any desired concentration, permitting the material to remain as long as desired in the stomach, and then either allowing the material to be evacuated into the bowel, or its efficiency destroyed by aspiration or by the injection of some physiologic antagonist.

"Mucus in excess of normal when clearly gastric and not swallowed is always an indication for local treatment, and a microscopic examination of the mucus removed gives some clue as to the type of treatment to be carried out. In the first place, there is a clear glassy form of mucus analogous to the mucus seen in mucomembranous colitis and characteristic of catarrhal gas-

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(1) Jour. Amer. Med. Ass'n., Nov. 3, 1917.
(2) Therap. Gaz., Jan. 15, 1918.

tritis, in which microscopic examination fails to reveal any evidence of inflammatory reaction. In other words, leukocytes are very scarce, and the mucus is rather the reaction to an irritant or possibly simply a myxorrhea such as is seen in certain cases of myxorrhea gastrica, and the presumption is that there is no infection present. This type of condition calls for lavage with various alkalies, followed by astringent applications—lavage, for instance, with a weak solution of bicarbonate of soda, or a dilute solution of the substances similar to the liquor antisepticus alkalinus, followed by the instillation of permanganate of potash 1:4000 introduced through the fractional tube in doses of 2 to 3 ounces and then reaspirated."

"If, however, examination shows that there are many leukocytes scattered throughout the gastric mucus and these leukocytes are for the most part polymorphonuclears, then the inference, particularly if numbers of bacteria are seen intimately mixed with the gastric contents of mucus and not discretely seen in threads, is that there is an infection in the stomach in which the following treatment may be carried out:

1. The fractional tube is passed into the stomach the first thing in the morning, and the complete residuum evacuated by placing the patient in different positions and aspirating as completely as possible.
2. This is followed by cleansing of the mucosa by lavage with alkaline solutions, preferably sodium bicarbonate 1:1000 or even 1:500, liquor antisepticus or alkalol in solutions as strong as 1:6 or 1:10, the method being to inject about an ounce and aspirate, repeating the injections until the lavage water is perfectly clear.
3. Follow the above lavage by hot water before applying the active disinfectant.
4. After the stomach is clear and while the patient is in the recumbent posture, introduce through the tube a measured quantity of some active disinfectant and allow it to act over a definite period of time, after which allow it either to pass into the duodenum, or dilute it with water, or introduce neutralizing substances, or finally, a measure the author often employs, aspirate as much of the material as possible." The most

energetic disinfectant which certainly acts as an alterative to the mucosa is nitrate of silver. In this way it is possible to introduce ½ grain or more of nitrate of silver and permit it to remain five or ten minutes in the stomach and then withdraw the entire amount. The method which the author regularly employs in all cases in which he finds muco-pus in the stomach is to introduce the silver nitrate in a small volume, or not over one ounce of solution, and after five or ten minutes aspirate as much as possible. The amount remaining will give no trouble. Ordinarily the material aspirated has already been largely converted into the chloride by the chlorides either in the stomach or secreted by it. The use of the organic silver preparations—argyrol, protargol, etc.—has not been so effective as the other preparation. Hydrogen peroxide has been used in these conditions, but in his hands it has not been so satisfactory. The same thing can be said regarding iodine. In the perfectly healthy stomach, if a quantity of hydrochloric acid is introduced into the stomach of an acid grade higher than that of the gastric juice, it is rather rapidly neutralized and brought down to a level with the other gastric secretion. In the anacid and subacid stomach the effect is different, and the reaction is entirely dependent on the pathologic factors which may be present. In gastric achylia, while the administration of even such small doses as 15 drops of the dilute hydrochloric acid will often control the diarrhea of achylia, it is impossible to determine any effect on the secretory curve by the administration of the small therapeutic doses of the dilute acid. In resistant cases it would be well to try what Rehfuss called "fractional administration" of the substance. With the fractional tube in place, a solution of hydrochloric acid of 0.25 per cent. is introduced through the tube at intervals of ten to fifteen minutes throughout digestion. As much as half an ounce every fifteen minutes throughout has been employed throughout the entire digestive period. After the mucus and evidences of catarrh are cleansed from the stomach in these subacid cases, a few treatments following the above directions often have a surprising effect on digestion and appetite. Dr. Daniels who re-marked the almost constant association of achylia with pellagra in the South, reported excellent results obtained by the fractional administration of hydrochloric acid.

The neutralization of the secretion in the treatment of ulcer as suggested by Sippy can best be done by leaving the fractional tube *in situ* in the stomach during several feeding and neutralization periods, removing fractional specimens and determining the degree and the duration of neutralization. In this way we can establish precisely the amount of alkali necessary.

These points, the author believes, may suffice to show that the future will enable us to treat true gastric disturbances much as we treat mucous membranes elsewhere, namely directly.

Absorption from the Bladder and Urethra. David I. Macht[3] has shown that, if a catheter is gently, introduced into the bladder of a male dog and a solution of apomorphine (0.1 per cent. to 1 per cent.) is injected into the bladder and the catheter left in place in order to prevent regurgitation of the solution into the urethral canal, absorption of the drug, as evidenced by emesis, is very slow. The dog generally does not vomit for half an hour or longer and sometimes he does not vomit at all. If now the same animal was used on another day and the same strength of apomorphine solution or even weaker solutions of the alkaloid be employed for the irrigation of its urethra, vomiting promptly follows, generally in from two to five minutes.

By confining small injections of the fluid to the posterior urethra or to the anterior urethra, the author found that the absorptive power of the posterior urethra is distinctly greater than that of the anterior. The explanation for this difference in the absorptive powers between the urethra and the bladder is not altogether clear; but the fact that the bladder is devoid of glands on the one hand, and the urethra contains numerous glands, on the other hand, is probably at least in part responsible for the phenomenon. The more rapid absorption from the posterior urethra may at least in part

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(3) Jour. Urology, February, 1918.

be due to the absorption through the prostatic ducts opening into the posterior urethra.

ETIOTROPIC THERAPY.

ANTHELMINTICS.

General Principles of Anthelmintic Medication. Maurice C. Hall[4] wishes to discuss, rather than to, urge the following general principles:

1. Anthelmintics are selective in their action; thus certain drugs are of value against tapeworms, but not against nematodes; others are of value against ascarids, but not against hookworms; etc. So far as dependable action is concerned, anthelmintics cannot be used over a wide range. Anthelmintic activity on the part of a drug is not proportional to antiseptic properties. Some of the best anthelmintics have very little germicidal power, while experiments show that excellent germicides have little anthelmintic power. In passing, it may be noted that germicidal power and insecticidal power are likewise unrelated as a rule.

2. Worms require not only a suitable anthelmintic, but also suitable modes of medication.

(a) Forms like the ascarids, which inhabit the small intestine and lie unattached in the lumen, are readily accessible to the ordinary types of anthelmintics. Thus ascarids may be entirely removed by a single therapeutic dose of oil of chenopodium in the great majority of cases, if only the usual precautions as to preliminary fasting are observed. In passing it may be noted that while ascarids are the easiest of all worms to remove by chenopodium, repeated doses of santonin are usually necessary to assure their complete removal. As a general rule, large worms are more vulnerable than small ones.

(b) Forms like the hookworm, which attach for indefinite periods to the intestinal mucosa and occasionally detach and remain free in the lumen of the intestine for a time before attaching again, show a response to

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(4) New Orleans Med. and Surg. Jour., December, 1917.

anthelmintics which may perhaps be correlated with this habit of attaching and detaching. Hence, no single course of treatment by any known drug or combination of drugs can be relied upon to expel all the ankylostomes which are present. Of course, this explanation of the failure of single hookworm treatments to achieve more than partial success, as due to the presence of one attached and one detached group of worms, is only theoretical. Other explanations would be that worms which were feeding at the time of treatment were susceptible to the anthelmintic, that individual worms had a greater resistance or were better protected by mucus, etc. Thus it has been suggested that the efficacy of chloroform against hookworms may be due to the rapid absorption of the chloroform by the blood and the ingestion of this chloroform-containing blood by the attached hookworms in amounts sufficient to produce anesthesia or lethal toxic effects.

(c) Forms like the whipworm, located for the most part in the cecum, are apparently not always exposed to the action of anthelmintics even when adequate doses of potent drugs are given. This is principally due to the fact that not everything that passes the ileo-cecal valve always enters the cecum. Hence in the treatment of whipworm cases it is good practice to administer anthelmintics in small doses, which must not, however, be too small, over a long period of time to ensure the entrance of the drug into the cecum. This irregular entrance of medicament into the cecum may explain why an anthelmintic may for a time bring away no worms, but when it brings away any, as it occasionally does, it not uncommonly brings away all of them. In man the presence of the appendix constitutes another complication. Presumably only a part of the intestinal contents which pass the ileo-cecal valve enters the cecum, of this only a part in turn enters the appendix. Hence it will take an even greater amount of treatment, as a rule, to remove them from the appendix. Indeed it has not been proved that anthelmintics exert any effect on parasites in the appendix.

3. It is important to use the proper vehicle. Fluid extracts or other preparations using alcohol as a solvent

for active anthelmintic ingredients are frequently unsuitable as anthelmintics. The very fact that alcoholic preparations are adapted to the production of rapid systemic effects—the effects one wishes to avoid in using the characteristically toxic group of drugs known as anthelmintics—is one reason why they are unsuitable as anthelmintics. These alcoholic preparations are often rapidly absorbed, largely in the stomach and duodenum, occasioning more or less irritation at the point of absorption and producing systemic effects of a more or less toxic nature. The considerable and rapid absorption leaves a comparatively small amount of drug available for actual anthelmintic action, and by the same token leaves the minimum of drug that could possibly be removed by purgation after exerting its anthelmintic effect. Alcohol has practically no anthelmintic value; if it had, the human race should have been freed from most of its parasites long ago. If alcoholic preparations of anthelmintics are to be used at all, it would seem advisable to dilute them very greatly before administration in order to throw the anthelmintic out of solution and delay absorption.

4. While olive oil seems to be decidedly contraindicated in combination with anthelmintics this does not seem to be the case with castor oil. In the author's experiments, the tendency of a mixture of olive oil and oil of chenopodium was found to remain in the stomach until largely absorbed, causing gastritis, and this constitutes an objection to the combination. This is probably because, of all foods, olive oil remains longest in the stomach. On the other hand, it is the purgative character of castor oil, its tendency to move promptly through the digestive tract, which appears to be responsible for the more satisfactory results obtained from the combination of castor oil and oil of chenopodium. Although there is absorption of castor oil as well as of olive oil, the absorption of castor oil appears to be such as to distribute the chenopodium content over a wider area and a longer period of time. What is desired in anthelmintic administration is, first, as little absorption as possible; and, second, since there must be some absorption, probably a large amount as a rule,

it is desirable to retard that absorption in order to distribute it over as large a surface of the gastro-intestinal mucosa as possible and to allow the maximum time for the body gradually to dispose of the drug by oxidation and elimination. The common statement that castor oil should not be given in connection with the oleoresin of male form, the author cannot endorse. His experiments indicate that oleoresin of male fern is more dangerous without the administration of a purgative than with the administration of a purgative and that adequate doses of castor oil, promptly administered, are as good in this connection as calomel, and perhaps as good as anything. The author is inclined to believe that the distributive and purgative action of castor oil goes far to offset the solubility factor in the case of male fern. Winslow and many other writers have published prescriptions or given directions for the use of castor oil as a purgative for male fern, and anthelmintics are marketed which contain both ingredients. As far as solubility is concerned, oil of chenopodium is as soluble in castor oil as male fern is, perhaps more so, but many experiments with oil of chenopodium indicate that its administration in castor oil gives superior anthelmintic value against some species of worms, at least, and maximum safety to the host animal. In a series of dogs given oil of chenopodium in therapeutic dose accompanied by olive oil alone or by olive oil and some purgative, almost all of the dogs showed a hemorrhagic condition of the stomach or small intestine on postmortem, a condition which was rarely met with in postmortem examination of a large series of dogs given oil of chenopodium in therapeutic dose accompanied by castor oil.

5. Some anthelmintics probably do not need to be allowed "time to act" on the worms before purgatives are administered. In over two years experimental work, involving the treatment and postmortem examination of over 250 dogs, the results seem to be a little better, if anything, where the anthelmintic and the purgative are administered simultaneously than where the anthelmintic is allowed to precede the purgative by an hour or longer. Such combinations as oil of chenopodium and castor oil, chloroform and castor oil, santonin and

calomel, etc., seem to be as effective as the ingredients of the combinations administered separately and at intervals.

6. Preliminary fasting is important. During gastric digestion there is a hyperemic condition of the gastric mucosa and the absorption processes are most active. Such of the anthelmintic as leaves the stomach with the chyme is too diluted, and the worms themselves are too well screened by the mass of partly digested food to permit of effective anthelmintic action. In the author's experiments the evidence on this point has been convincing. On the other hand, the desirability for fasting before anthelmintic treatment is not due, as has been often stated and is too commonly believed, to the parasites becoming starved and so ingesting the anthelmintic more readily.

7. Gastric stasis might occasionally interfere with the efficacy of anthelmintics. In such cases anthelmintics might lie in the stomach for long periods or be slowly absorbed there. The author believes the gastric stasis might be reasonably invoked as the explanation for occasional failure in anthelmintic medication, especially where purgation follows treatment at a long interval and where such depressant or constipating drugs as oil of chenopodium are used.

8. The passage of worms following anthelmintic treatment is a better indication for repeating or continuing treatment than for stopping treatment. The action of oil of chenopodium against ascarids is the only case in which the author has commonly found approximately 100 per cent. efficacy against worms in single, therapeutic dose of an anthelmintic, and this drug will occasionally fall below this point in efficacy. A patient may pass a large number of worms, and have a much larger number left. Only when a well-selected treatment finally fails to bring away worms, does it establish a fair presumption to the effect that all worms of the sort involved have been removed. This of course, should be checked up by a consideration of the persistence or disappearance of symptoms, and, even more, by microscopic examination of the feces for parasite eggs. The latter should extend over a period of perhaps two weeks after

treatment and should cover several days in that period if accurate information is desired, as it seems well established that anthelmintic treatments may inhibit worm egg production for some time, and it requires several negative examinations of feces to establish a fair presumption in favor of freedom from infestation where infestation is suspected or known to have existed.

A severe helminthiasis, with a feeble, emaciated patient suffering from enteritis as a result of numerous worms and with the bodily resistance already much lower as a result of worm toxins, is itself a contraindication for anthelmintic treatment both as regards the production of local irritation in the digestive tract and the production of toxic systemic effects. The ordinary plan of attack, suitable for reasonably strong patients, with moderate infestations is not suitable for these. In bad cases, repeated small doses of anthelmintic should be used, preceded or accompanied by building up of the bodily resistance by nutritious food.

10. While the majority of worms passed after anthelmintic treatment come away in the first 24 hours after treatment, there is a fairly large percentage which will commonly come away from one to six or seven days later. This delay is perhaps due to a poisoning of the worms which weakens or sickens them to the point where they are brought away some time after the anthelmintic treatment. In the author's series of experiments on anthelmintics, using dogs as experiment animals, he found that with tenia 100 per cent. were passed the first day; 0 per cent. were passed the second to the seventh days inclusive. Aside from tenia, there came away during the second day, from 7.4 per cent. to 15.7 per cent. of worms that were removed. During the third day, or the third 24-hour period, there came away from 0 to 18.2 per cent. of the worms removed. During the fourth day, there came away from 0 to 10 per cent. of the worms. During the fifth day, there came away from 0 to 1.5 per cent. of the worms. There were no worms passed on the sixth day. On the seventh day, there came away from 0 to 0.5 per cent. of the worms passed. It must be understood that these figures are merely statement of the findings in these experiments, not at all intended

as a statement of a rule, but they suggest that the physician who takes into account the feces for only 24 hours after treatnent, may overlook things of importance.

[This is one of the most valuable articles on the topic of anthelmintics the editor has seen.]

Chenopodium is assuming considerable importance of late as one of our best anthelmintics. Hence the following abstract of "notes," by Maurice C. Hall[5] on this drug may be of interest. "Chenopodium is also known as American wormseed, Mexican tea, Spanish tea, Jesuit tea, Jerusalem tea, and Jerusalem oak. These terms are applied to the plant *Chenopodium anthelminticum Linnaeus*, also known as *Chenopodium ambrosioides anthelminticum*, a member of the Chenopodiaceae or Goosefoot family of the order of chenopodiales. Chenopodium is said to have been naturalized in this country from tropical America, and to occur in waste places from New England to Florida and California. The plant grows to a height of 2 to 3 feet and may be distinguished by the odor of the volatile oil of chenopodium which is noticed when the leaves, stem, or seeds are crushed. Chenopodium is said to have been used by the American Indians as a vermifuge and as a treatment for dysmenorrhea. Following the Indian's use of chenopodium, there has been a long "wormseed tea" period, during which period this valuable anthelmintic was largely used as a home remedy on the farms and by the colored "mammies" of the south. At the same time our medical men generally ignored this valuable anthelmintic and used imported, and in the main less effective drugs. An appreciation of chenopodium, which began before the outbreak of the present war, has been intensified by the shortage of imported drugs since the war began, and at present chenopodium is being very largely used and is receiving an increasing amount of study and attention.

"In anthelmintic medication, the bruised fruit has been given in doses of 20 grains in an electuary; or the expressed juice of the fresh plant used in tablespoonful doses; or the decoction made by boiling an ounce of the fresh plant in a pint of water given in 2-ounce doses;

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(5) Therap. Gaz., April 15, 1918.

or the fluid extract given twice a day for three days in doses of from 15 minims to a drachm; or the oil of chenopodium derived from the plant by distillation has been given, according to various published reports, as follows:

"With preliminary purgation with Epsom salts, and without preliminary purgation; in doses of 3 to 10 drops, 15 drops, 16 drops, 10 minims, 15 minims, 16 minims, 17 minims, 21 minims, 30 minims, and 0.22 mil to 1 mil, for adults; the dose is given once or repeated for a total of two to three doses; the interval between doses is a half-hour, an hour, two hours, four to five hours, and twenty-four hours; the oil is given in sugar, molasses, honey, milk, emulsion, capsules, or globules; it is followed by Epsom salts, Glauber's salts, castor oil, castor oil and chloroform, black draught, unspecified cathartics, or by no purgation whatever; the interval between the last dose of oil and the dose of purgative is usually two hours, sometimes four hours; the oil of chenopodium is occasionally combined with castor oil, chloroform, and oil of eucalyptus. Most writers advocate the use of three doses with a one or two-hour interval between doses. It may be noted in passing that a minim and a drop of oil of chenopodium is not at all the same thing. A casual test with a pipette shows over two drops to the minim; a given number of minims, therefore, constituting more than double the dose of the same number of drops. The maximum dose is that given by Keith (1916) three doses of 30 minims each at hour intervals." Coutant (1916) reported a case of severe poisoning from this dose. As oil of chenopodium is distinctly constipating, it should be given with a purgative. Experimental work indicates that the prompt administration of castor oil has a very distinct protective value against the irritant and toxic properties of oil of chenopodium, saving the lives of dogs that were given doses found to be lethal when given without castor oil, and it appears to be superior to any other purgative for use with oil of chenopodium.

The Pharmacology of the Oil of Chenopodium. William Salant(6) points out the importance of this oil as shown by the fact, that it has been employed in several million cases of hookworm disease in the last few years. Hence the necessity of making available the results of pharmacologic investigations.

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(6) Jour. Amer. Med. Ass'n., Dec. 15, 1917.

Oil of chenopodium is a strong local irritant, causing severe inflammation of the mucous membrane. Of particular importance is the observation made that a dose which is not effective at first may cause serious symptoms and death when repeated within one or several days; this sentiveness to the oil of chenopodium persisting for from five to nine days. Fasting or poorly nourished animals succumbed to much smaller doses. The resistance was noticeably greater, on the other hand, in animals that had been receiving a rich carbohydrate diet for several days before the oil was given, or when the administration of the oil of chenopodium was preceded by a sufficient quantity of fatty oil, such as olive oil, cocoanut oil, or castor oil.

Disturbance of renal function may be caused as shown in experiments in which the permeability of the kidney was tested after the administration of oil of chenopodium. Albumin and casts were frequently found when it was given to rabbits in an emulsion in acacia.

Its poisonous nature was also shown by the tendency to cause depression of the circulation and respiration as well as to lessen the intestinal movements. Uterine contraction may likewise be inhibited if the isolated organ is exposed to the oil.

The substance under consideration should therefore be handled with caution. In the presence of renal or cardiac disorders, oil of chenopodium should be given in small doses only; while, in advanced cases of chronic nephritis or heart disease, its use would seem to be altogether contraindicated. In hepatic and gastrointestinal diseases it may likewise prove more toxic.

Treatment of poisoning. When large doses have been swallowed lavage may be resorted to with beneficial results. The routine administration of large doses of castor oil before and soon after oil of chenopodium, as recommended by Hall and Foster, should be given serious consideration, as it may prove to be of prophylactic value. No chemical antidote has yet been found.

The treatment in cases of poisoning would, therefore, be symptomatic. Digitalis and epinephrin are excellent antagonists. Caffein, on the contrary, aided the action of the oil of chenopodium.

The Administration of Oil of Chenopodium. W. H. Zeigler[7] by experiments upon dogs substantiates the findings of Salant, who made tests to determine whether tolerance could be established in rabbits. He found that non-toxic doses proved fatal when repeated in a day or two, thus pointing to a cumulative action. All animals dying from oil of chenopodium showed an acute toxic gastritis. The most characteristic condition noted under microscopic examination was an acute diffuse nephritis. The liver showed necrosis with cloudy swelling and hemorrhagic infiltration. That the absorption of the drug is more rapid from the stomach than from the intestine was shown by the fact that when administered in salol-coated capsules, twice the fatal dose was frequently survived. While the author is unable to say just what the effect this delayed absorption of the oil when administered in enteric capsules would have upon its vermicidal effect, he is inclined to believe that the most rational method of administering the drug in hookworm disease would be in this manner. Atropine antagonizes the salivation, emesis, as well as the depressing effect upon the respiration so that, when atropine was given at the same time, it was only after very large doses that death would result from oil of chenopodium. When a medicine dropper was used it was found that it took 150 drops to make one fluid dram or 60 minims. Each minim being equal to 2½ drops. The pharmacopeal dose is 3 minims or about 8 drops. The dose recommended in uncinariasis is 16 drops or minims, repeated in several doses. It is clearly seen that if minims are used, the dose would be excessive, the patient receiving about 40 drops at a dose. If this is repeated for three or four doses at hour intervals it would undoubtedly produce toxic symptoms. The most accurate method of measuring would be to use a graduated pipette.

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(7) Interstate Med. Jour., October, 1917.

ANTISEPTICS AND DISINFECTANTS.

CHLORINE PREPARATIONS.

Antiseptics of the Chlorine Group, Their Relative Germicidal Efficiency. H. D. Dakin and E. K. Dunham[8] bring out the fact that "rapid and complete disinfection is brought about by solutions (one volume) of members of the chlorine group of antiseptics of the strength commonly used in the treatment of wounds, when added to heavily infected blood serum-muscle extract (two volumes); while, under similar circumstances, solutions of acriflavine, brilliant green, and other dyes failed to sterilize in six hours, mixtures which the chlorine antiseptics completely sterilized in five minutes or less."

The author's results are at variance with those of Browning and his colleagues, as to the relative germicidal efficiency of chloramine-T and other antiseptics of the chlorine group, compared with brilliant green, malachite green, and acriflavine, Browning having found these various dyestuffs superior to the chlorine antiseptics.

With substances intended for wound disinfection, no standard method exists, so in carrying on their experiments, the authors paid special attention to time of action, temperature, and number of organisms present, using blood serum-muscle extract for a medium as having some similarity to that in which the antiseptics would be used in wound treatment. The experiments were all carried out at 32-35° C. The media were heavily inoculated with *Staphylococcus aureus* emulsion obtained by shaking a twenty-four hour agar slant growth with 8 ml. of salt solution. After determining the total number of organisms in the mixture by plating an aliquot part, 1 ml. of the antiseptic solution was usually added and samples withdrawn from time to time and the surviving bacteria were estimated. In most cases the antiseptics was added at about the concentration commonly used for wound treatment.

Neutral Solution of Chlorinated Soda (Dakin's So-

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(8) Brit. Med. Jour., Nov. 17, 1917.
(9) Jour. Amer. Med. Ass'n., March 23, 1918.

have used ether intraperitoneally in all patients coming to operation, suffering from peritonitis, a total series of sixty-six cases with seven deaths, or a mortality of 10.4 per cent. This series includes gastro-intestinal perforations from disease, gunfire and stab wounds, abortion, leaking pus tubes and tuberculous peritonitis.

"In a fair percentage of the cases primary union was obtained throughout the line of incision and the patients recovered without going through a process of sloughing of the abdominal wall, frequent dressings, prolonged stay in the hospital, postoperative hernia, and morbidity so frequently encountered in this type of infection."

"Encouraged by the beneficial results obtained following the use of ether in peritonitis, Haines gradually enlarged the field of application to other infected regions of the body; scalp wounds complicating skull fracture, other open fractures, osteomyelitis, tuberculous abscess cavities, sinuses, broken-down tuberculous testis, abscess of the thyroid, infected lymphatics and septic wounds of other soft structures, with very gratifying results."

Ether used locally, the author believes, certainly surpasses all other methods in preparing the scalp, axilla, pubes and scrotum for surgical procedure.

"L. Picque (1915), and L. Ombredanne, report a large number of cases of gas gangrene wherein they had used ether after removal of foreign bodies and establishing free drainage. After thoroughly irrigating the wound with ether they introduced pledgets of lint which had been steeped in ether into the various cavities and recesses and applied a large compress saturated with ether over the entire field, this in turn was covered with cotton and other dressings with a view to preventing rapid evaporation by excluding atmosphere. Dressings were changed twice daily and the results were surprisingly good in that the infectious process was checked in from three to six days, although crackling and gangrene were present in some of the cases before treatment was instituted."

The author concludes that the local use of ether in peritonitis has been clearly proven clinically to be of buted on the surface, after the hydride has evaporated. As pentane is a local anesthetic, the application of iodine in this vehicle is much less distressing to the patient than its solution in alcohol. Patients actually say it feels good when applied to a sore. This hydride penetrates, evaporates, and discharges its burden of iodine exactly where it is required to build up a wall between germs and tissues. The latter are not attacked by it, but furnishing secretions the iodine is dissolved and carried in turn to a site of maximum efficiency. Meanwhile the harmless volatile amyl has gone into space, having served its purposes and departed. The solution is stable, does not change with light, nor does it precipitate. Its vial merely requires a good and a properly placed cork, since the contents are volatile.

ACIDS.

Trichloracetic Acid a Specific in Vincent's Angina. T. J. Gallaher[1] uses a small applicator wound with cotton and dipped in the pure liquid acid, the excess removed by touching it against an ordinary blotter. By this means, the acid is applied to the entire area affected. After the parts have turned white, the acid should be neutralized by the application of a saturated solution of sodium bicarbonate. May be repeated in two or three days if necessary.

Sugar-Lactic Acid Treatment of Septic Wounds. Moruzzi[2] says that he has had good results from a solution of 15 gm. of lactic acid and 250 gm. sugar in 1,000 ml. water, in treatment of septic wounds, which after the surgical clearing out of the lesion, were dressed with this solution, renewed twice a day, the dressing being left undisturbed.

ETHER.

Ether as Antiseptic. W. D. Haines[3] reports that for the past two and one-half years he and his assistants

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(1) Laryngoscope, St. Louis, July, 1918.
(2) Policlinico, June 23, 1918, abstr. Jour. Amer. Med. Ass'n., Aug. 17, 1918.
(3) Amer. Jour. Surg., January, 1918.

lution) in the Normal Peritoneal Cavity. F. C. Mann and W. G. Crumley[9] report that the usual effect of an intraperitoneal injection of a fresh preparation of Dakin's solution into an etherized dog is an immediate and marked drop in blood-pressure. This result occurs with relatively small quantities. In an unanesthetized dog it produces pain. At the necropsy of a dog dying after an intraperitoneal injection, the peritoneal cavity and usually the pleural cavities contain a dark blood-stained fluid, the omentum and the intestine are perforated with numerous holes. The parietal peritoneum on the side on which the animal has lain is edematous. The effect of the injection of Dakin's solution into the pleural cavity in amounts too small to produce a mechanical action, is practically negligible. In one dog, 20 c.c. of the solution injected into the right pleural cavity did not produce any noticeable effect, while 5 c.c. injected intraperitoneally produced a marked reaction. The intravenous injection of Dakin's solution in the dog is comparatively not very dangerous. The only changes noted were increased coagulation time and a laking of the blood, which assumes a very dark color. Blood-pressure is only slightly affected by doses which produce a marked reaction when injected intraperitoneally.

It is certainly a curious finding that an amount of solution which is practically innocuous in either the pleural cavity or the vascular system should produce quite marked effects when injected into the peritoneal cavity.

IODINE PREPARATIONS.

Pentane as Solvent for Iodine. This is asserted to be much superior to alcohol. Rose F. Ofrias[10] points out that, at the time of our Civil war, the halogen and this liquid known then as amyl hydride were mixed and the mixture was employed for antiseptic purposes. Under the name "Iodized Hydride," a solution of iodine in amyl hydride, 1.3 gm. to 30.0 ml., was employed which when applied to the skin leaves the iodine equally distri-

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(10) Med. Record, Dec. 22, 1917.

material benefit in making for the wellbeing and recovery of the patient; and that it may be safely used in peritonitis, the toxicity of ether when used intraperitoneally being slight. Ether produces a certain degree of immunity from the ravages of toxemia for a few hours following its introduction into the peritoneal cavity which may turn the scales in favor of the patient's recovery.

The Mode of Action of Ether in Surgical Infections. John Saliba[4] believes that ether at one and the same time harms the bacteria and helps vital resistance. Ether, whether in its vaporous or liquid state, has been proved to have a bactericidal action, though spore-bearing organisms are strongly resistant to it. According to some laboratory workers, ether has never failed to sterilize albuminous culture media. On the other hand, ether increases the vital resistance in the following three ways: By inducing active hyperemia, by increasing exudation, by stimulating cell proliferation. Leukocytic emigration apparently goes on unaffected in the presence of ether. That ether does not prejudice the healing of an aseptic wound, is strong evidence that it does not hamper the defensive agents of the body and the vital resistance of its tissues.

Almost all antiseptics have no selective, specific or stronger action on the bacteria than on the living cells and tissues in which the bacteria are embedded. If they destroy the life of the bacteria, they destroy also the life of the cell. We must, therefore, keep in mind the fact that when bacteria are actually in the living tissues nothing but the living tissues can destroy them, and direct our efforts to the finding of an agent which will help and stimulate the living tissues in their work, and give up our useless claims and comparisons of agents which act as bactericide and cytoclast at one and the same time. The author believes that ether surpasses all the antiseptics at present known, by reason of the double action above described. In the treatment of abscesses, Saliba, after evacuating the pus by an incision or aspiration, and flushing it with normal salt solution if the pus is thick, introduces ether into the

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(4) New York Med. Jour., Jan. 26, 1918.

cavity and sews up the incision generally without drainage. While ether should not be used in peritoneal infections which are caused by the passage of the organisms through the walls of the intestines, as in a case of general peritonitis with obstruction, it is valuable in cases where infecting material is being introduced into the peritoneal cavity from outside, as it is in a localized perforation of a hollow viscus with escape of its contents. After removal of the extravasated material and the prevention of further leakage, the use of ether by lavage or instillation is beneficial. The author is of the opinion that the success of the treatment of empyema depends on the early recognition of the condition, and then immediate evacuation of the pus by aspiration followed either by the injection of ether in full strength or by the irrigation with ether in dilution.

In treatment of joint cavity infections, the author advises aspiration of the joint cavity, injection of ether, and application of extention and weights to overcome muscular contraction. If the joints refill, they should be re-aspirated and ether again injected. Experiments are cited (Topley, 1915), which showed that, when injected into the healthy joint of an animal, ether was rapidly absorbed, small effusion produced, and when opened after one week the joint was found normal. The joint, into which ether was injected some minutes after its inoculation with a bacterial culture and which was opened seven to ten days later, appeared normal, save that it contained a minute amount of white, structureless caseous material. Without the injection of ether, a joint inoculated with the same culture and examined seven to ten days later, was found markedly swollen and to contain a large amount of pus.

VOLATILE OILS.

The Germicidal and Therapeutic Action of Garlic. A panegyric on this ancient remedy is published by W. C. Minchin[5] who believes that there is probably no more valuable drug mentioned in any pharmacopeia than oleum allii, the active oil of garlic. It is composed

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(5) Practitioner, February, 1918.

of allyl sulphide with volatile terpenes; and it appears to Minchin to be Nature's antiseptic for internal use, for it not only destroys many different germs of disease within the human body, but is harmless to the body tissues. In this respect it differs from all other known antiseptics of any great value. He believes that it not only acts as prophylactic in such diseases as typhus, typhoid, and diphtheria but that it also is of curative value. Minchin strongly advises a trial of 1 drachm of fresh succus allii sativi every four to six hours in the first two diseases. It may be given in beef tea, or other such fluid, or with syrup. Children take it freely in syrup; half a drachm is sufficient for a child under twelve years.

In the treatment of diphtheria, the author asserts, garlic acts better than anything else heretofore recommended. One of the best and most simple methods of using it is to instruct the patient to keep a small portion of the bulb in the mouth and occasionally to score it with the teeth in order to expel a little juice. This should be continued until the piece of bulb has been reduced to a pulp, when it may be swallowed and replaced by another piece. In three or four hours, from one to two ounces of garlic bulb may be used in this way. At the expiration of this time, sometimes before one can procure serum for injection, it is usual to find that all membrane has been removed from the tonsils, etc., whilst very often two large moulds of the posterior nares, not unlike pigeon's eggs, have been discharged; the patient expresses gratitude for the decided relief; the temperature falls quickly, and becomes normal in a few hours. This treatment also is usually curative in those cases of diphtheria which have come under observation too late for serum to be of use in them. In short, it robs this disease of all its terrors. During the first four hours' treatment, it is not so much the amount of garlic used which is of the first importance, as keeping it constantly in the mouth, so that it may act as a local application. It is, however, necessary that an appreciable amount of the juice should constantly remain in the mouth during this time, for if it is insufficient in quantity it will take much longer to obtain the same result (12 to 24 hours). The fresh juice of garlic diluted with an equal part of water, makes a suitable application, and will be grateful to those who find the bulb too hot. In the case of young children, this mixture can frequently be applied by means of a coarse spray. It may be diluted with any fluid or, if prepared with jelly and dispensed in bottles sufficiently wide-mouthed to admit a teaspoon, a little may be taken frequently, and kept in the mouth as long as possible, when it may be swallowed and repeated. Two ounces of this 50 per cent. preparation may be taken during the first four hours, but much less is usually enough. An overdose can scarcely be taken. A patient suffering from diphtheria can neither smell nor taste garlic, but merely finds it hot. Septic throats rapidly yield to the same treatment. The treatment of whooping cough had always appeared to the author to be very unsatisfactory until he tried the effect of garlic.

In the treatment of tuberculosis, Minchin who is the author of a book entitled, "The Treatment, Prevention, and Cure of Tuberculosis and Lupus with Oleum Allii," suggests garlic not only as a cure but also to differentiate between medical and surgical tuberculosis. "If garlic, properly applied does not cause a great improvement in a pulmonary or otherwise localized case of tuberculosis in a few weeks, we are dealing with a surgical condition." He quotes from Mr. Marshall Wm. McDuffie's paper (Interstate Medical Journal, 1914), who tried in over one thousand cases of tuberculosis, almost all the remedies advocated for this condition: "Of these treatments, but two stand out as regards anything like specific action upon the tubercle bacillus and tuberculous processes—that is, clinically speaking. They are garlic from the vegetable kingdom and mercury from the mineral. Garlic gave us best results, and would seem equally efficacious, no matter what part of the body affected, whether skin, bones, glands, lungs, or special parts. Dosage, used internally, one drachm of the expressed juice or two drops of the essential oil three times a day; externally, poultices of crushed bulbs, one part with three parts of lard, or ointment of garlic (50 per cent. juice in vaseline) applied daily.

Dr. Cavazzani (Lancet, Jan. 9, 1904), reports experiments on eight guinea-pigs six of which had been submitted to a preventive treatment for a fortnight, each swallowing daily 0.6 grams of garlic juice. He insufflated dried and powdered expectorated mucus from tuberculous patients into the larynx of each guinea-pig. Two guinea-pigs were kept as controls throughout the experiment. Three of the remaining six were given the above-mentioned quantity of garlic for a fortnight, and the other three were given a similar amount till the end of September. He killed the animals in the first week of October. The controls were thoroughly tuberculous. In the bodies of the three animals which had been treated with garlic for one month only 10 to 20 small tubercles were found. In the bodies of the other three guinea-pigs, those which had been treated with garlic up to the end of the experiment he could find no tuberculous formations, though the most minute examination was made.

The author believes that the low death-rate from tuberculosis in some of the most overcrowded and dirtiest slums is due to the garlic-eating habits of the residents. A similar explanation, the author thinks, also may show why the death-rate from this disease among Jews in many parts of the world is particularly small, and may explain why, as time goes on, the death-rate from tuberculosis amongst Jews steadily rises, as garlic-eating among Jews who have been born in this country is seldom indulged in, nor do the higher-class Jews (of the professional classes) use garlic to any extent.

"Professor Koch showed that a small percentage of allyl alcohol inhibits the growth of the bacillus anthracis." Good results are obtained from applications of a 50 per cent. ointment in cases of anthrax, carbuncles, and boils.

"Ozena and otorrhea often yield to applications of garlic, when everything else has failed. A lotion of the strength 1-6 of succus allii sativi, in distilled water, is suited to this purpose. Foul ulcers, bed-sores, gangrenous and sloughing wounds are rapidly cleansed and made healthy by dressings with the succus at a strength of 1-4 with distilled water, or an ointment 25 per cent. to 50 per cent. with vaseline. This dressing applied to gangrenous wounds will stop the gangrenous process, and thereby will frequently save a limb. Similar dressings applied to a stinking and painful cancer will cleanse and deodorize it and free it from much pain, but it will not cure it. An excellent dressing for burns is made by the addition of 20 per cent. of filtered succus allii to carron oil. Garlic is an excellent remedy in capillary bronchitis, foetid bronchitis and bronchiectasis, and in some forms of asthma. The ingestion of garlic causes some biting insects, notably ticks, to avoid those who take it.''

Should these claims inspire incredulity, all the author asks for is a test.

DYES.

Gentian Violet Specific Disinfectant Against Gram-positive Organisms. John W. Churchman[6]—having found that a selective bactericidal property was possessed by gentian violet and that this selective property ran roughly parallel with the Gram reaction; the dye possessing a relatively low degree of toxicity and the power of penetrating living cells, staining *e. g.* throughout its depth the mucosa of a living animal's bladder filled with the dye—decided to use it clinically in the treatment of suppurative infections of joints. Churchman had noted that it was impossible to stain the mucosa of the pharynx as long as it was protected by its natural layer of mucus. He therefore devised an apparatus for irrigating the knee joint, so as to free it of pus, mucus and fibrin. The washing is done first with salt solution, then with hydrogen peroxide, and finally again with salt solution until the fluid returns perfectly clear. Gentian violet 1:1,000, is now forced into the joint, left in for five minutes, at the end of which time one can feel reasonably certain that the synovial membrane has been thoroughly stained. It may then be withdrawn and a small amount of weaker dye, 1:10,000, introduced. The results of this treatment proved that

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(6) Jour. Amer. Med. Ass'n., April 13, 1918.

gentain violet can be used in strong solutions applied to the surface of the synovial membranes without the slightest damage. The author feels justified in concluding that apyogenic or gonorrheal infections of the synovial membrane of the knee may be cured simply and promptly by lavage of the joint and staining with gentian violet. It is evident that these findings open up possibilities for the treatment of other confined infections. For example the author is now working on the treatment of abscesses near the surface, which he hopes to aspirate, irrigate, and stain in the same way; and it is his intention also to see if this sort of treatment can not be applied to other cavities, particularly to the pleural cavity, and to the pelvis of the kidney. He is furthermore attempting to use it in actual injection into the tissues themselves. There is no doubt that it is slightly irritating when injected directly into the tissues. The pain of this irritation can be however completely overcome by dissolving the dye in 2 per cent. procain solution instead of in salt solution; but, even when this is done, if the dye is used in solutions as strong as 1:1,000, there is some danger that it will lead to necrosis, which might possibly be due to distention. Thus far a few severe cases of pyorrhea alveolaris have been under treatment with encouraging, and, in one of the cases, quite striking results. He is also studying the effect of staining, with gentian violet, skin infected with parasitic diseases, with the hope that the application of this stain to the surface and its injection under the surface may render the tissue so hostile to parasitic growth as to conquer the infection.

URINARY ANTISEPTICS.

The Synthesis of Urinary Antiseptics. This is being investigated by Edwin G. Davis and Edwin C. White.[7] To be an ideal internal urinary antiseptic, a drug must be chemically stable, non-toxic and non-irritating to the urinary tract; antiseptic in high dilution in urine, regardless of the reaction of the latter; and eliminated

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(7) Jour. Amer. Med. Ass'n., March 2, 1918.

unchanged in high percentage by the kidney. There is no such drug known.

Of the urinary antiseptics in common use, hexamethylenamine is by far the best; but it has very definite limitations, owing mainly to the fact that an acid medium is essential for the liberation of the formaldehyde upon which its activity depends. Furthermore, to quote from Hinman (1915), "The necessity of concentration, and time for the accumulation of formaldehyde in antiseptic amounts, largely destroys the value of the drug for kidney antisepsis; for bladder antisepsis in cases with polyuria or frequent urination, except when retention in some form is present; in cases of urinary fistula, notably post-operative prostatics during the period of incontinence, and in cases with continual bladder drainage as in true incontinence or with retention catheter; and for urethral antisepsis no matter what the infection. The greatest usefulness of hexamethylenamine is in bladder prophylaxis in cases in which the above urinary conditions are not present. Methylene blue, in a dilution of 1: 150,000, will inhibit the growth of staphylococci. But there has been no experimental work showing that methylene blue does not undergo modification either in the blood-stream or in the urine so as to lose its antiseptic value, as has been shown (Davis) is in the case with so many other compounds. Hinman states that "the value as internal urinary antiseptics of other substances such as salol, oil of sandalwood, salicylic, boric and benzoic acids, is very limited;" and concludes that there is no known drug with properties even approaching those of an ideal urinary antiseptic.

Phenolsulphonphthalein comes very close to filling all the above stated requirements, but it has no antiseptic properties. It is the most satisfactory of all the tests of renal function because of the remarkable rapidity and completeness with which phenolsulphonphthalein is eliminated by the kidney, as well as because of its non-toxicity and the ease with which it lends itself to colorimetric estimation. In view of these remarkable properties, the investigators above named thought it worth while to attempt a modification of the phenolsulphonphthalein molecule, with the hope that an antiseptic compound might be produced which still retained the properties of the original drug. The total number of compounds experimented with at present is over two hundred.

"Mercury fluorescein" is the most interesting compound yet studied, and very closely approaches the ideal. The substance, which appears to be a perfectly definite chemical individual, is fluorescein containing organically bound mercury; that is, the mercury is present in a non-ionic form. It is chemically stable, is very rapidly excreted and is antiseptic in urine. Its toxicity is at present being fully investigated. Thus far the authors have found that 5 mg. doses, injected intravenously, have caused dogs to excrete urine that is definitely germicidal for at least one hour following administration. Preliminary experiments have shown no injurious effects from this dosage. Of course, this substance cannot be considered completely harmless. The matter then resolves itself into a question of relative toxicity; that is, the attainment of a compound combining minimum toxicity with maximum efficiency, so that small but effective doses may be safely used.

Hexamethylenamine Albuminuria and Hematuria. Joseph R. Wiseman[8] reports 5 cases receiving doses of hexamethylenamine, varying from 0.6 to 4.0 gm. daily, who showed symptoms of intolerance. He says, "When untoward effects appear during the course of hexamethylenamine administration, they usually may be traced to the following causes: Insufficient dilution of the drug, high urinary acidity, or personal idiosyncrasy. The most common symptoms are those of vesical irritability, and may vary from slightly increased frequency of micturition to severe vesical tenesmus or even strangury. Albumin or blood is often present in the urine. Unless obscured by blood, the macroscopic appearance of the urine is very characteristic. It is pale in color, turbid from pus cells, and shows a large number of flakes and shreds which are different than those seen in any other condition. The source of the blood

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(8) Amer. Jour. Med. Sci., August, 1917.

found in patients showing urinary irritation is probably the bladder."

The author reaches the conclusion that the most important cause of the albuminuria or hematuria following the administration of hexamethylenamine is abnormally high urinary acidity. In 4 out of the 5 reported cases the acidity was above 100 in terms of decinormal sodium hydrate, and in one case it reached the exceedingly high figure of 140. It is therefore necessary to carefully determine the urinary acidity of all patients who are taking hexamethylenamine. If the acidity becomes too low (less than 20) or disappears entirely the drug is inefficient, whereas with a high degree of acidity, irritative symptoms are likely to appear. High dilution of the urine impairs the formaldehyde action; concentration of the urine increases formaldehyde activity, but favors unpleasant results. The physician must therefore steer a middle course.

"The treatment of irritation of the urinary tract following the administration of hexamethylenamine is simple. Withdraw the drug, give large amounts of fluid, together with alkalies; and in a short time conditions will almost invariably return to normal."

Sandalwood Oil Administration in Gonorrhea. Dr. Paul Vidal[9] considers sandalwood oil as specific in gonorrhea, as quinine is curative in malaria, mercury and arsphenamin in syphilis, if given in proper dosage. To be able to administer the oil in sufficient dosage, all that is necessary is not to take the drug during or within two hours preceding meals. The time of ingestion with reference to the meal is the most important thing. Furthermore, the drug must be of absolutely guaranteed purity; and should be put up in capsules of 1 gram net.

"In acute gonorrhea, the daily dose should be from 6 to 7 grams for two weeks. These 6 to 7 capsules of 1 gram net are equal to 24 or 30 of the capsules, containing not more than from 25 to 30 centigrams, usually given. The hours of administration are: 2 capsules each at 8 a. m., 3 p. m., and 9 p. m. From the 15th

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(9) Translated from the "Ann. des mal. Vénér." in The Critic and Guide, August, 1918.

to the 20th day only 4 grams are taken daily. From the 20th to the 38th day, 3 grams. From the 30th to the 40th day, 2 grams. This represents a complete course of treatment of 145 capsules on an average. Though an almost complete cessation of the discharge, pain, and all other symptoms be obtained at the end of 24 hours, the treatment should be continued in order to avoid relapses and to secure a complete cure.

"In chronic gonorrhea, the administration must be intermittent and must proceed as by successive heavy blows. A daily dose of 6 grams should be given for from 8 to 15 days with pauses of from 8 to 15 days. The cure will be accomplished in about 3 or 4 months."

"Sandalwood oil introduced into the system is transformed into powerful antiseptic agents which, however, differ from other antiseptics in that their action is continual and by the fact that the microbe is not able to acquire a resistance to sandalwood oil even if the latter be administered for long periods."

The author even believes that the drug may be employed as a prophylactic, by expressing the contents of a capsule into the opened meatus and, as an additional precaution, taking 1 or 2 capsules of 1 gram each by mouth.

PROTOZOICIDES.

ARSENICALS.

The Too Intensive Arsphenamin Treatment of Syphilis. M. L. Heidingsfeld[10] believes that cases treated by intensive, frequently repeated doses, almost to the point of tolerance, and long continued administrations of arsphenamin, compare very unfavorably with those that receive only one or two administrations. He found that well-to-do individuals, who eagerly sought and received the most prodigal attention, became usually serologically fixed positive, and showed persistent clinical manifestations which nothing could influence favorably. The indifferent, careless, negligent and often indigent patient who received only one administration,

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(10) Jour. Amer. Med. Ass'n., Aug. 10, 1918.

wilfully absented himself for six months or a year, almost uniformly showed no trace of clinical manifestation and became serologically negative. These routine observations soon led Heidingsfeld to adopt a more conservative plan of treatment which, he is now convinced, is conducive to more favorable results.

He advocates that every syphilis patient, not previously treated with arsphenamin, receive a commensurate full dosage of this agent, which is not again repeated in from four to six months, except in the face of a threatening and serious manifestation. A serologic examination is made every thirty days for the first six months. If there is no material change for the better, or the serologic examination shows a relapsing character, treatment is repeated at the end of the first four months. If the serologic reaction shows improvement, but is not negative, or if there are fairly well defined clinical manifestations, treatment is invariably repeated in six months. This plan is continued until the patient becomes persistently serologically negative and devoid of all manifestations of well-defined clinical nature. Both the Wassermann test and the Hecht-Gradwohl reaction are indispensable in efficient therapeutic management, and bear a reciprocal value to each other; the Wassermann reaction uniformly showing the first evidence of improvement, and frequently reaching a completely negative phase before the Hecht-Gradwohl test becomes completely negative.

His finding that quite a number of the patients who show a persistently positive Wassermann reaction were recipient of intensive initial arsphenamin treatment, the author believes to be due to induced arsenic-fastness, as developed *in vitro* by Akatsu and Noguchi (abstr. 1917 Practical Medicine Series, Vol. VIII). It is fair to assume that what takes place *in vitro* can also occur *in vivo*. Long before the discovery of the cause of syphilis and present day laboratory achievement, clinicians observed empirically what the laboratory is to-day able to demonstrate scientifically; namely, that syphilis in a relatively short time acquires a tolerance of antispecific remedies, which is not removed until the individual is given a definite respite from further specific treatment. It is noteworthy that the greatest degree of clinical improvement and usually the most prompt and greatest amount of serologic improvement follows on the heels of the first administration. A single maximum initial dose should theoretically effect the best therapeutic results. The author particularly decries the long-continued administration of small fractional doses.

Intrarectal Administration of Arsphenamin. Auggusto S. Boyd and Morris Joseph[1] believe that the intrarectal administration of arsphenamin is a successful method of treating syphilis and relapsing fever. Untoward effects are practically eliminated by slower absorption, no special skill in administration is required. The authors consider it the method of choice in nervous subjects, in obese or very anemic women, and in children; and claim that it offers at least the same curative value as the intravenous route. The method used is very simple. The arsphenamin or neo-arsphenamin is prepared just as for the intravenous method; and can be made up with a similar or smaller amount of fluid, from 25 to 50 ml. for neo-arsphenamin and about 100 ml. for arsphenamin. The patient is put to bed and the solution is allowed to run slowly, allowing about ten minutes for the injection. The patients, especially children, are urged to retain it. The preliminary administration of a cleansing enema is a good procedure to adopt. Injections may be given safely every three days, the full dose for men and women being 0.9 gm. of neo-arsphenamin or 0.6 gm. of arsphenamin; and, for children, 0.1 gm. for each 25 pounds of body weight. Out of nine cases five showed a moderate or complete improvement in the Wassermann reaction, and the other four showed little or no change. The majority of patients showed improvement from symptoms after from three to five intrarectal injections, even when the Wassermann reaction remained unchanged.

Permeability of the Meninges to Arsenic. J. Henry Barbat[2] reports he has found that arsenic can be made to pass into the spinal fluid in more than 96 per cent. of cases, in which an intravenous injection is combined

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(1) Jour. Amer. Med. Ass'n., Aug. 17, 1918.
(2) Ibid., Jan. 19, 1918.

with spinal puncture, while previous investigators have been unable, except in a few instances, to recover arsenic in the spinal fluid after its intravenous administration. It is very probable that the meninges are not permeable except when irritated. The author believes that by reducing the intraspinal pressure we may also increase the permeability.

The technique employed is as follows: The patients are given intravenous injections of either salvarsan, neosalvarsan or arsenobenzol. Within twenty minutes the spine is tapped, and the fluid allowed to run until it barely drops, the quantity removed varying from 30 to 60 c.c. When twenty-four hours later the spine is again tapped, arsenic in very minute amounts was found in the fluid.

The author believes that this method possesses many advantages over that of Swift and Ellis, that the clinical results will be found as good, if not better. However, he is inclined to believe that the antibodies residing in the blood serum and passing into the spinal fluid play a more important part than the minute proportion of arsenic found.

John B. Rieger and Harry C. Solomon,(3) by examining the spinal fluid of patients at various intervals after intravenous injection, found that of 123 fluids the arsenic contents of thirty-nine became appreciable within one or two hours. The shortest interval at which arsenic was found was thirty minutes; the longest, two hours. Whether the fluids found negative were so because their arsenic contents at the time of collection had not reached the limit of delicacy of the analytic method or because they had already depreciated therefrom, they can not state. Also, because of the few samples collected at intervals beyond two hours, it cannot be concluded from these data that no arsphenamin passes into the cerebrospinal fluid after the second hour or that it does not remain there in appreciable amounts for periods longer than one hour.

The authors suggest that intravenous injections of divided doses at one or two hour intervals would prove more effective in maintaining a high concentration of arsphenamin in the blood for longer periods, and thus possibly allow increasingly greater amounts to pass into the perivascular spaces.

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(3) Jour. Amer. Med. Ass'n., July 7, 1918.

Toxicity of Neodiarsenol. Erwin P. Zeisler[4] reports that using a recent substitute for neosalvarsan, neodiarsenol, marketed by a Canadian firm in dosages of 0.6 and 0.75 gm. dissolved in from 10 to 15 ml. of freshly distilled sterile water, he obtained, in a recent series of twenty intravenous injections given to fifteen dispensary and private patients in all stages of syphilis, an unusually large percentage of reactions.

Salvarsan and Neosalvarsan Myelitis. G. W. McCaskey[5] reports a fatal case of myelitis after the patient suffering from tabes dorsalis had been given four treatments of neosalvarsan intraspinally, the dose having been gradually increased from 0.5-1 mg. up to 1.8 mg. Following this, the patient, on June 16, was given the same sized dose without any marked reaction, although the symptoms were more severe than usual. Eight days later, the same treatment produced an immediate reaction that was not unusually severe; but on the next day the patient complained of weakness in the legs, and inability to void urine. The slight motor and sensory impairment present in the lower extremities gradually increased to complete paralysis; and, in the course of four to five days, a decubital ulcer commenced to form over the sacrum. In a week's time the patient died, the only additional feature of interest being the enormous extent of the trophic ulcers.

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The author concludes, "The most plausible hypothesis seems to be the action of toxic compounds in the form of intermediary bodies with especial affinity for the neurons formed in the retrograde changes which occur in the salvarsan compounds and which may vary in different individuals and in the same individual at different times, and of the exact nature of which we are entirely ignorant. Considering the enormous number of these treatments given, the occurrence of myelitis is so rare that it should be ignored as a negligible possibility."

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(4) Jour. Amer. Med. Ass'n., Dec. 29, 1917.
(5) Ibid., Dec. 8, 1917.

The Administration of Adrenaline, Especially Its Use with Arsphenamine. O. Milian[6] regrets that the preventive and curative effect of adrenaline against the accidents from arsphenàmine (salvarsan) to which he called attention in 1913 is not sufficiently well known or practised. That wonderful results can be obtained from this remedy in the nitritoid crises and serous apoplexies of arsphenamine has been confirmed by numerous authorities. Still we hear of fatal cases from the administration of the arsenical in which adrenaline had not been tried. It seems that there are many who still hesitate to use it because they do not know how to employ it.

To administer adrenaline with benefit and without danger, it is necessary to take into account three factors: the quality of the product, the dose, and the method of introduction.

Regarding quality, Milian calls attention to the fact that the synthetic product is far superior to "natural" adrenaline, *i. e.*, the substance obtained from suprarenal glands. Owing to the instability of this body, it is important that it be obtained in properly prepared ampoules and never in bulk. Milian insists that adrenaline poured out of bottles should be rejected, as it is too unstable and too readily contaminated with microörganisms. The substance reddens on oxidation, and it is deficient in activity in proportion to its discoloration. Turbid solutions should be rejected, as the turbidity is either due to oxyadrenaline, which is absolutely inactive, or to microbial growth, which is liable to produce abscesses. In this connection it is well to know that the solution can be boiled for a short time to sterilize it without loss of activity. However, if the product has become deteriorated by oxidation or microbial growth, boiling will, of course, not restore the activity it has lost.

Milian characterizes the dose of 0.25 mg. given by the codex, as a homeopathic dose. To check the congestive accidents, early or late, of "606," much larger doses are required. One must give, *at least*, 1 mg. at a time; and often more. Milian has given 2, 3, 4 mg.

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(6) Paris méd., Feb. 2, 1918.

of adrenaline within a few minutes as a preventive to the nitritoid crises. These doses can be tolerated without harm, if they are given in a progressive manner, if the effects of each dose upon the organism are carefully observed, and if the proper mode of administration (hypodermic) is carried out.

The author believes that the existing fear of adrenaline is not justified. Rabbits tolerate subcutaneous doses of 2 mg. per kg. without harm, and it is only when twice this dose is given that an occasional death (1 in 4) occurs. This would mean that we might possibly give a man weighing 60 kg. a dose of 120 mg. subcutaneously without harm. We could surely give six to ten times as great a dose as that which is generally administered, without danger, provided it is given subcutaneously, with proper precautions.

The mode of introduction is of the greatest importance in this connection. Thus, while 4 mg. is rarely fatal to the rabbit when given subcutaneously, one-tenth that dose is often fatal when given intravenously. In the human, 0.1 mg. injected intravenously, *in concentrated solution*, is liable to produce alarming symptoms; and 0.5 mg., thus given, has almost produced death. *When this substance is given intravenously, it must not only be given in minute doses, but also in a very dilute solution and in an interrupted manner,* so that the injection may be stopped, if the symptoms of reaction become too violent, before an excessive dose has been introduced. One may, for instance, inject 0.1 mg. in 10 ml., or better, in 100 ml. of salt solution. The injection of such an amount will rapidly subdue a nitritoid crises without producing more marked symptoms than slight pallor of the face or moderate rise in blood-pressure. Tachycardia does not usually appear until more than this amount is injected. When it does, the injection should be stopped. In the presence of serous apoplexy, which the author believes to be due to deficiency of adrenaline in the patient's blood-stream, such injections may be used with great advantage. For instance, in such a case, in which the patient was semi-comatose, the author has used 0.25 mg. of adrenaline diluted with 25 ml. of normal salt solution with immediate and definitive resurrection. This patient had previously received 3 mg. by mouth and an intramuscular injection of 2 mg. within two hours without perceptible improvement.

While the oral administration is most convenient, it is less certain in its effect than subcutaneous or intramuscular injection. However, it may with advantage be used concurrently with these. It is well to give adrenaline by mouth less than an hour before an injection of "606," as one can, in this manner, quite surely prevent nitritoid crises and other reactions. One may give 1 or 2 mg. in a little water. If desired, one may repeat such dose at ten minute intervals. Too many of them may produce vomiting.

Subcutaneous and intramuscular injection differ from each other in that the latter is much prompter and violent in its action, but also more fleeting. The subcutaneous injection is milder and more prolonged in effect; but it is liable to produce pain in the injected part that may last for 24 hours. The dose for subcutaneous injection may be 1 mg., while that for intramuscular injection should not exceed 0.5 mg. In both forms of injection it is necessary to make sure that the point of the needle is not in a vein, which can readily be done by slightly withdrawing the piston of the syringe before driving it home, to see whether blood appears. If it does, the needle should be withdrawn and reinserted in a different place. It is also well to avoid giving the subcutaneous injection intracutaneously, as this may possibly result in necrosis. The author has never seen a subcutaneous injection produce such result, though it causes a marked blanching of the skin. Inasmuch as the effect of a subcutaneous dose is not obtained for ten to fifteen minutes, it is necessary to use it by as much time prior to an injection of "606," if one wishes to anticipate a nitritoid crises in a susceptible subject.

Milian distinguishes between the use of adrenaline in three different kinds of reaction; and reminds us, at the same time, that it is useless against the Herxheimer reaction, or against the erythemas.

For the prevention of reactions occurring several hours after the injection (fever, headache, vomiting, diarrhea, etc.), oral administration might suffice. It is well to give 2 mg. of the remedy an hour before the injection, another dose 5 minutes prior, and another dose 1 hour after the injection. It is also desirable to continue the use of 1 mg. per mouth, morning and evening, for four consecutive days.

To prevent the nitritoid crises, which appears immediately, often while the injection is being given, and are characterized by facial congestion, vomiting, anguish, etc., it is well to use a subcutaneous injection in conjunction with the oral use of the remedy. One may replace, for example, the second dose of adrenaline, that given 5 minutes before the injection of "606," by a subcutaneous injection of 1 mg. of adrenaline and an intramuscular injection of 0.5 mg. If a crises still arises, it is due to insufficiency of dosage. Hence one should see to it that, prior to giving the injection of "606," the symptoms indicating sufficiency of dosage of adrenaline are present. These are pallor of the face —called by the author the leukoreaction, rise in blood-pressure, tachycardia, and general trembling. Of these four signs, the leukoreaction of the face is the most important. It may be characterized by a corpse-like pallor of the face or the pallor may be slight. In either case it is not accompanied by tendency to fainting. While the leukoreaction is present, it is certain that the nitritoid crises, which is characterized by congestion of the face, will be antagonized. When a very large dose of "606" is given, it is necessary to increase the dose of adrenaline.

It is impossible to fix a rule regarding the dose to administer in serous apoplexy; it is proportional to the result to be attained. The physician should repeat, at short intervals, the intramuscular and subcutaneous injections in the doses above specified and must not leave a patient who is in a coma from serous apoplexy until he has shown signs of improvement (such as return to consciousness, notable diminution of the facial congestion, etc.), and then only on condition that he prescribe the continuance of the medication by mouth, in doses of 1 mg. every hour, and that the attendance of an experienced person has been secured. The results obtained from this treatment in this condition are so prompt and striking that the author believes they prove that we do not have here a simple vaso-constriction antagonizing a vaso-dilution, but a specific effect. He thinks it might be well to try combination of adrenaline with other endocrine glands, most especially with hypophysis.

[The practical points given above on the administration of adrenalin are not only of value in its use in connection with arsphenamin, but in its employment for other effects as well.—Ed.]

O. Nägeli[7] confirms, by his experience, the claims of Milian. Thus, a patient particularly susceptible to develop an erythematous eruption after each injection of arsphenamin could be protected against this exanthem by the preliminary intramuscular injection of 1 ml. of 1/1000 adrenaline. This author also reports an excellent result from adrenaline in arresting the disturbances in a severe case of meningeal irritation after neo-arsphenamin. Nägeli also found this treatment of value in warding off violent diarrhea after taking mercury.

Arsenical Melanoderma Produced by Cacodylate of Iron. Douglas W. Montgomery[8] reports the case of an Irishman, over 70 years of age, whom he had treated previously with salvarsan and mercury for an old lues. This patient was given the cacodylate of iron because of a profound anemia, receiving 19 doses of 0.06 gm. each, given within twenty-five days. After the nineteenth dose he showed a dirty, reticulated pigmentation of the skin across the lower part of the abdomen, and on the temples and forehead. The mottling was due to lighter areas which in some places were quite clear. On discontinuance of the drug, the pigmentation slowly vanished. Subsequently, under the care of a friend, this patient was given a more rigorous course of this same drug, developed both an alliaceous odor to his breath and characteristic cutaneous pigmentation, which again cleared up after stopping the cacodylate.

There was no evident reason why the patient should have been so susceptible to this particular arsenical

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(7) Cor.-Bl. f. Schweiz. Aerzte, Sept. 29, 1918.
(8) Med. Record, June 29, 1918.

reaction, says the author, since the kidneys though not free from disease, yet functioned well; and the cacodylate, given either by him or subsequently, produced no renal symptoms. That the pigmentation was due to the arsenic the author does not doubt; for it appeared during the administration of the drug, it disappeared on discontinuance, and it reappeared on resuming this form of medication.

That the above mentioned dose of cacodylate of iron 0.06 gm. is a moderate one may be seen by comparing it with the doses of cacodylate of sodium as formulated recently by Gougerot (1917) for subcutaneous injection:

Daily weak dose	0.06 to 0.08 gm.
Daily moderate dose	0.10 to 0.08 gm.
Bi-weekly strong dose	0.30 to 0.40 gm.
Weekly, exceptionally strong dose	0.60 gm.

The arsenical content of cacodylate of iron should be 48.17 per cent.; and, assuming that the cacodylate of iron found on the market corresponds to this, the patient received a little less than 0.60 gm. of the metal arsenic (As) in twenty-five days.

Hyperpigmentation, though not an infrequent consequence of the administration of arsenic, when given in large doses and for considerable lengths of time, is not nearly so frequent as irritation of the conjunctivae and puffiness of the lower lids. As is well known, arsenic may also produce congestion of the hands and feet, dryness of the throat, disturbances of the stomach, diarrhea, increase of the quantity of urine, as well as urticarial and erythematous skin eruptions and hyperkeratosis, in addition to pigmentation of the skin. In explanation of these phenomena, the author says: "Arsenic undoubtedly stimulates the epithelial covering of the oculo-respiratory, gastro-intestinal, genito-urinary, and cutaneous systems, and the stimulation of such vast epithelial sheets, would account at least in part for the well known toxic effects of the drug." This stimulation, however, does not occur equally in all cases, neither as distributed throughout the vast areas above enumerated nor in individual situations.

In the instance reported, there was marked stimulation, as far as could be ascertained, of only one function, the pigment forming function of the skin.

[This same theory of arsenical stimulation of epithelial surfaces may serve as a basis for the explanation of many of the therapeutic uses of arsenic.—Ed.]

The Value of Arsphenamine in Amebic Dysentery Compared with that of Emetine. F. Heim[9] believes that the value of arsphenamine in the treatment of amebic dysentery is not sufficiently appreciated, even though Milian called attention to it in 1911, and a number of others have confirmed his observation. Heim reports, in detail, four cases of amebic dysentery. In one of these emetine was efficacious, at first, but failed in later attacks, while arsphenamine brought about a rapid cure. In another case in which emetine, efficacious at first, also lost its effect in a second attack, arsphenamine produced a marked but brief improvement without effecting a cure. However, in two other cases, with hepatic complications, arsphenamine produced no effect whatsoever, while emetine proved itself radically curative.

While the author is unable to arrive at positive conclusions on the basis of these few cases, he feels that it is important to call the practioners' attention to the following propositions:

1. That there exist cases of amebic dysentery in which salvarsan shows itself superior to emetine, and *vice versa.*

2. That arsphenamine is probably more efficacious in the purely enteric form of the disease, while it is certainly less active in the hepato-bronchial complications.

3. Arsphenamine had better be administered by rectal injection, as it is possible to apply a larger dose (0.75 to 0.90 gm.) more directly. Should, however, the infection not be accessible from the surface, the intravenous method should be resorted to, especially as it has been ascertained that from 60 to 65 per cent. of the drug is eliminated into the stools.

4. It is better to prescribe but one medicament at a time; so that, should habituation to one of these occur, recourse to the other would still be available. Only

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(9) Cor.-Bl. f. Schweiz. Aerzte, March 2, 1918.

in most rebellious cases, might it be well to try the combination of the two agents.

Mercurials.

Calomel Inunctions Should Supplant Those of Blue Ointment. This is the practical recommendation arrived at by Jay Frank Schamberg, John A. Kolmer, George W. Raiziss and Joseph L. Gavron[10] who performed experiments upon rabbits in the following manner: Rabbit A, which received the inunctions, had its head projecting into the outer air through an aperture in a heavy piece of canvas attached to one end of the box. Rabbit B received no inunctions, but was constantly inspiring an atmosphere heavily laden with mercury vapor. The experiment was repeated five times, ten rabbits being used for the entire investigation. Chemical examination of the organs disclosed the fact that animals rubbed with large amounts of mercurial ointments and dying shortly thereafter exhibited considerable quantities of mercury in the kidneys and the liver. The control animals which were so placed in the experimental box that they were constantly inspiring an atmosphere heavily charged with mercury, did not exhibit effects of mercurial poisoning. The inunction experiments also demonstrated that calomel ointments may be absorbed through the skin in sufficient amounts to produce fatal mercurial poisoning. The employment of mercurial ointment by inunction has been restricted in practice, because it is extremely dirty, soils the bed and body linen, and thereby discloses the nature of the treatment. Calomel is far more cleanly; and, moreover, is more easily absorbed through the skin. The following formula has given the best results:

		gm.
℞	Hydrargyri chloridi mitis	3
	Lanolini	1
	Adipis benzoinati	2

For each inunction.

A somewhat larger dose of calomel than metallic mer-

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(10) Jour. Amer. Med. Ass'n., Jan. 19, 1918.

cury is necessary. The authors believe that the safest method of introducing large amounts of mercury into the system is by inunction.

[These conclusions agree well with those of Wile and Elliott, abstracted in Vol. VIII, Practical Medicine Series, 1917.—Ed.]

Emetine and Other Amebicides.

Emetine Diarrhea Might be Beneficial in the Treatment of Amebic Dysentery. This is the opinion of George C. Low[1] in opposition to the statements by Kilgore and Liu (1917), that the diarrheic stools due to emetine are almost indistinguishable to the eye from those of amebic dysentery for which the drug is given, and that, when emetine diarrhea occurs, blood and mucus reappear. In the old days of the ipecacuanha treatment, the remedy was pushed until a profuse diarrhea was produced. After the cessation of the drug, solidity of the stools was quickly obtained, and to all intents and purposes many of the patients were cured clinically. "Since the oral administration of emetine, in the form of emetine bismuth iodide, has come into vogue, diarrhea has become even more marked than when the drug was given by the needle. This, however, is exactly what one aimed at in giving ipecac. In addition to the specific action of the drug, the bowel is thoroughly washed out; and this mechanical process is beneficial and not detrimental. (Compare the saline treatment of bacillary dysentery.) A few days after the termination of the course (twelve consecutive nightly doses of 0.18 gm. of emetine bismuth iodide) the stools begin to become solid; and in a few days more, if cure has taken place, are formed and of a normal consistence. The liquid stools produced by the emetine, apart from the absence of amebae and cysts in them, are, as a matter of fact, easily distinguishable from the true dysenteric stools, and there is no excuse for any one pushing the remedy to such an extent as to cause dangerous symptoms and even death. Reappearance of

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(1) Brit. Med. Jour., Oct. 13, 1917.

blood during treatment is very rare; when it does occur it is often due to piles."

The Toxicity of Emetine Hydrochloride. This has been studied by J. Guglielmetti[2] of Buenos Aires. He calls attention to the fact that, while the powder keeps well, boiling a 2 per cent. solution of this salt for 15 minutes causes a slight lessening of its toxicity; but a much greater diminution of its amebicidal properties. The unfavorable action of contact with light and air are less marked. He, therefore, advises that solutions should be freshly prepared with sterilized water in a sterile bottle.

He differentiates between rapidly fatal doses, deferred toxicity, and cumulative action.

Massive doses are rapidly fatal, either by arrest of the heart, especially on intravenous injection; or, with smaller dosage, by disturbance of the nervous system. Death occurs within 24 hours.

Dilution and rapidity of injection have an important influence upon the toxicity of intravenous injections. Thus, when a 1/2000 solution is injected in the course of five minutes, it takes a little more than five times as much to inject a fatal dose as with the rapid injection of a 5 per cent. solution.

Deferred toxicity shows itself with doses a little smaller than the massive doses referred to above, death occurring within 7 to 12 days.

Most important is the author's observation on cumulative toxicity. He has found that the daily administration of one-tenth the rapidly fatal dose is capable of finally killing an animal, as susceptible to the poison as the dog. One-twentieth of the rapidly fatal dose produces only transient effects.

Those interested must be referred to the original article for the various fatal doses elaborated by this observer for various animals. Regarding human dosage, he arrives at the following conclusions:

For adult man, the rapidly fatal dose has not yet been established; but it probably ranges between 0.60 to 1.20 gm. administered at one dose. Such doses will

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(2) La Presse Médicale, Jan. 24, 1918.

probably never be reached, for it is not necessary to exceed 0.15 gm. a day.

This author believes that emetine hydrochloride should never be given intravenously, as it exposes the patient to the danger of heart failure without any advantage whatsoever, because emetine is found just as well in the intestine after a subcutaneous injection.

Cumulative toxicity is now sufficiently well known in man to enable Guglielmetti to formulate the following rules: Not to inject 0.15 gm. daily during more than 5 or 6 consecutive days; nor 0.10 gm. during more than 8 or 10 days, or 0.05 gm. for more than 15 or 20 days. He advises long intervals between series of injections.

The Intravenous Administration of Emetine Hydrochloride. Joseph W. Larimore[3] reports that he has employed emetine intravenously in the treatment of amebic dysentery during the past year, using 0.06 gm. at each injection. The injections were given quickly and in one milliliter of fluid. He believes that the intravenous use of emetine would apparently give more adequate concentration of the emetine in the circulation. It also obviates the soreness which follows the subcutaneous, and, in a lesser degree, the intramuscular injections. Though this soreness is not so severe as unduly to favor intravenous administration, its avoidance facilitates the handling of certain types of patients. "If emetine injected in any manner is adequately concentrated by the selective excretory faculty of the gastro-intestinal mucosa, it is not necessary to secure its greater concentration by intravenous injection. However, this selective excretory faculty is only presumptive and it is doubtful if it is exercised by the hepatic parenchyma. For infection at these sites intravenous injection would seem to be more efficacious. After several injections there was noted in a few cases an arterial hypotension. A few cases gave no subjective reaction until after several doses suggesting an accumulative action." The author concludes that the intravenous administration of emetine in 0.06 gm.

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(3) Southern Med. Jour., August, 1917.

doses in concentrated solution and rapidly injected is a safe procedure.

Results from Emetine Bismuth Iodide in the Treatment of "Carriers" of Entamœba Histolytica. D. G. Lillie and S. Shepheard[4] present a report on 104 cases treated in a special ward set apart for the purpose. All the patients received 0.20 gm. of the drug, once daily, during breakfast for 12 consecutive days without any additional treatment. Some patients received several courses of such treatment. They succeeded in curing 66 of these patients, a cure not being recorded until at least six or seven negative tests were obtained over a period of not less than 7 weeks from the termination of the course of treatment. That an increase in the total dose might give a greater percentage of cures, is suggested by the fact that out of 160 cases, treated in other wards, 142 patients or 88.7 per cent. were cured. In these cases the total dose of emetine bismuth iodide varied from 2.4 gm. to 13.0 gm., while in the 104 cases treated by Lillie and Shepheard the maximum dose was 4.8 gm.

They found that patients who had received previous injections of emetine were more resistant to the emetine bismuth iodide treatment than those who had not. This is probably accounted for by the fact that there are certain "carriers" who cannot be cured by emetine in any form. It is, however, possible that injections of emetine might render the "carrier" less curable by emetine bismuth iodide.

The authors believe they have noted in this study a superiority of salol-coated pills (obtained from Allen and Hanbury) over keratin-coated tabloids (of Burroughs Wellcome and Co.). Of the 79 men who received keratin-coated tabloids, 41 were cured—*i. e.,* 52 per cent. Of the 25 men who were given the salol-coated pills, 17 were cured, *i. e.,* 68 per cent. Of 24 men who relapsed after one course of keratin-coated tabloids, 4 were cured by a second course of the same form of the drug—*i. e.,* 16.6 per cent. Of 14 men who relapsed after two or three courses of the keratin-coated tabloids, 4 were cured by one course of salol-coated

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(4) Lancet, Sept. 15, 1917.

pills—*i. e.*, 28.5 per cent. There was decidedly less vomiting after salol-coated pills than after the keratin-coated tabloids: the ratio being as 3.7 to 7. That this is not the reason for the greater percentage of successes with the salol-coated drug, the authors believe, is demonstrated by their figures which show that there was nearly as much vomiting among the men who were cured as among those who relapsed. A curious fact noted by these observers is that men over 40 are less likely to vomit while undergoing this treatment than are younger men.

[The difference in the figures does not seem sufficiently great in so small a series to conclude that salol-coating is actually better than keratin-coating.—Ed.]

Oil of Chenopodium in the Treatment of Amebic Dysentery. M. E. Barnes and E. C. Cort[5] note that, while emetine has been found to be extremely effective in acute amebiasis, when given hypodermically, physicians working in tropical countries are apparently not altogether satisfied with this agent, as it is by no means atoxic, and there are cases of amebiasis which fail to respond to the emetine treatment. The authors realize that, in view of the large number of other drugs offered, only positive and striking results would justify one in adding to this formidable list. Such results the authors believe they have obtained with oil of chenopodium. Some patients, after having been given a preliminary dose of 15 gm. of magnesium sulphate, received two hours later 1 ml. of the oil of chenopodium in capsule. One hour later, a second dose of 1 ml. of oil of chenopodium was administered, followed within an hour by 45 ml. of castor oil. In more severe cases, the preliminary saline was omitted, and 2 ml. of the oil of chenopodium were administered in 45 ml. of castor oil at a single dose. In other cases, the oil of chenopodium emulsified with gum acacia was administered by rectum. In such cases, the anal mucosa must be protected with petrolatum, and it is well to terminate the injection with 60 ml. of an inert oil. The buttocks should be elevated, the enema given slowly and with great care, the first dose not exceeding 240 ml. in the

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(5) Jour. Amer. Med. Ass'n., Aug. 3, 1918.

adult. This enema should be retained for an hour, if possible. If the parts are well protected with petrolatum, the patient does not suffer from the intense burning sensations which would otherwise accompany the expulsion of the enema. In practically every case, after treatment by one of the foregoing methods, there was a marked improvement in the condition, as blood and mucus disappeared from the stools on the second day after treatment. In a few cases this improvement was not evident or was only temporary, but not more frequently than with emetine. The authors also report the successful use of oil of chenopodium in two carriers of amebic cysts, thus confirming the claim of Walker and Emrich regarding the effect of oil of chenopodium on amebic cysts. (Abstr. Practical Medicine Series 1917, Vol. VIII.)

For ambulant cases, oil of chenopodium is very convenient. It can be sent to a patient combined with castor oil, so that its administration requires no specially trained assistant, as would emetine, under the circumstances. Emetine might thus be reserved for those patients who fail to respond promptly, or who show a tendency to relapse. On account of its irritating effects on the kidneys, oil of chenopodium should not be repeated in full doses at intervals of less than two or three weeks.

Chaparro Amargosa and Simaruba in the Treatment of Persistent Carriers of Entamœba Histolytica. S. Shepheard and D. G. Lillie[6] report a series of 81 carriers of *entamœba histolytica,* treated, with a single exception, with at least two courses of emetine bismuth iodide, but still passing either cysts or free *E. histolytica* in their stools, who were treated with either "chaparro amargosa" (*i. e.,* "bitterbush." Its botanical name *Castela nicholsoni*), which grows wild abundantly in Southern Texas and Mexico, or with Simaruba bark obtained from a plant botanically related to chaparro amargosa, and containing a similar, if not identical, bitter principle. They used various parts of the drug. The dose was five heaped teaspoonfuls of the powdered drug daily.

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(6) Lancet, April 6, 1918.

Decoction from three of these teaspoonfuls were given by mouth, and from two by enema. The method used for preparation of the decoction was to boil the heaped teaspoonful of chaparro amargosa powder in about 20 oz. of water for 15 to 30 min. It was allowed to cool and then strained. Three times every day a teaspoonful of the powdered drug was thus prepared and given to patient to drink half an hour before meals. At about 10 a. m. and 6 p. m. an enema of the drug, also prepared as above, was given to the patient in elbow-knee position. A rubber catheter (warmed and oiled before introduction) was used, connected by rubber tubing to a glass funnel. The patient remained in the elbow-knee position for 15 minutes if possible after injection, and was kept in bed for at least two hours after the drinks and enemas. On the days before the treatment the bowels were well opened with mag. sulph., and the patient given a light diet, such as fish or chicken. The treatment generally lasted ten days. The results with the different parts of the drug are summarized as follows:

Preparation.	Cases Treated (81).	Cases "Cured" (34).
Chaparro twigs and leaves......	7	4
Chaparro root bark	30	11
Chaparro root	33	16
Chaparro bitter principle	4	0
Simaruba	7	3

Pain, vomiting, nausea, and increased number of motions were caused by all preparations, except the twigs and leaves, which gave no vomiting; but only 7 cases had this preparation. In no case were the symptoms so severe as to interfere with treatment. No case with free *E. histolytica* in the stools was cured, and in these cases abdominal pains and the number of the motions per diem were increased by the treatment. Of the six cases who were given drinks without enemas three were cured, and it is possible that enemas are not an essential part of the treatment.

The Protozoicidal Power of Papaverine. D. I. Macht and H. G. Fisher[7] undertook to test the conclusions

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(7) Jour. of Pharm. and Exp. Ther., August, 1917.

arrived at by Pick and Wasicky[8] regarding the high toxicity of papaverine, against unicellular organisms, such as *Paramecium, Colpidium, Ameba,* and *Trypanosoma brucei.* They were led to undertake this study by the close chemical relationship between emetine and papaverine, and found papaverine more toxic for ameba than emetine, and surpassed in that respect only by quinine. As the result of their study, they concluded that papaverine might be more useful than quinine or emetine in the treatment of amebic dysentry.

Macht and Fisher compared the toxicity of the principal opium alkaloids and their derivatives for protozoa, and attempted to analyze the mechanism of the toxic action. Their work was done upon a definite species of paramecium, the effects of the drugs being studied upon hanging drop preparations. They found that morphine and the other alkaloids of the pyridinphenanthrene group, such as codeine, and thebaine, and the derivatives of morphine, such as heroine and dionine had little or no effect upon these organisms. Papaverine, on the other hand, and the other alkaloids of the benzyl-isoquinoline group, such as narcotine, and narcein, were highly toxic to these organisms. Papaverine showed a greater toxicity against these organisms than any of the others, and even surpassed emetine, though it was surpassed by quinine. Combination of alkaloids of the two different groups gave a synergistic effect, so that morphine plus narcotine were more toxic than the arithmetical sum of the individual effects of their components. On the other hand, a combination of two alkaloids belonging to the same chemical series gave only an arithmetical combination and showed no potentiation. A combination of all the opium alkaloids such as found in pantopon produced a markedly synergistic effect.

The authors believe that the toxic effect of the alkaloids of the papaverine group is due to the unoxidized benzyl nucleus. They arrived at this conclusion because alkaloids such as cotarnine and hydrastinine, which contain only the iso-quinoline nucleus, were

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(8) Wien. klin. Wochenschr., 1915, xxxviii, No. 22.

found to be entirely innocuous; while those alkaloids containing also a benzyl nucleus such as, hydrastine, and emetine, as well as papaverine showed themselves very toxic. Peronin or benzyl morphine was the only morphine derivative that was toxic to the paramecium. Hence, its poisonous action must be attributed to the presence of the benzyl grouping in that alkaloid. Following up this clew, they experimented with benzyl acetate, which they found more active than any of the other substances tested, it killing the organisms within two minutes when used in dilution of one to one thousand. Even benzyl benzoate which is practically insoluble in water and was therefore used in one to one thousand suspension, proved itself extremely toxic to the paramecia.

The authors believe they have noticed a "narcotic" or anesthetic effect from papaverine and dionine upon the paramecia, which seems to harmonize well with observations previously made on the effect of these alkaloids on the sensory nerve terminals.

[Though the authors do not emphasize this fact, it seems that the high protozoicidal power of benzyl acetate and most especially of the insoluble benzyl benzoate suggests that these substances might possibly have a therapeutic value in the treatment of intestinal infection with protozoa.—Ed.]

Quinine and Other Hematozoicides.

The Suppression of Gastric Troubles Produced by Quinine. Paul Revaut[9], in order to avoid complaint of gastric disturbance from the administration of quinine has, of late, been experimenting with compressed tablets of quinine hydrochloride covered with enteric coating, that is, a coating insoluble in the stomach but soluble in the intestine. Among these he used a coating of gluten sweetened with saccharin. He believes that he obtained perfect absorption from these tablets; and, of course, there never was gastric intolerance. Another advantage of these tablets is that they are perfectly tasteless.

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(9) Presse méd., March 18, 1918.

[A serious disadvantage, however, is that the absorption of such tablets must be seriously interfered with. This might, of course, be overcome by the use of larger dosage. So that the method might be of value when irritation makes the gastric route otherwise impassable.—ED.]

The Use of Cinchona in the Treatment of Malaria is resuscitated by Paul Baufle,[10] not as superior to quinine, in the majority of cases, but as useful on certain occasions. Thus he considers it specially valuable when quinine produces gastric intolerance, vomiting, diarrhea, and particularly in the dyspeptic. The author also believes that it is equally advantageous in the treatment of hemoglobinuric fever, in which one may fear to give quinine. Thus, in one of his patients suffering from this condition, cinchona has appeared sufficient to allay the attacks and the hemoglobinuria did not recur in the course of the treatment. It can be employed, with hope of benefit, in cases resistant to quinine, especially in chonic intoxications, and in malarial cachexia with its multiplicity of visceral derangements, in which it acts as a stimulant and tonic. It may also be employed with advantage in convalescence from malaria, after a course of quinine has been finished; and may be used as malarial prophylactic as well.

The author asserts that cinchona in doses of 9.00 gm. per day, representing 0.26 gm. of quinine hydrochloride, has given, on the whole, results as satisfactory as would have been obtained from much larger doses of quinine.

Finally, the much lower price of cinchona and the fact that patients without exception prefer cinchona to quinine, because of its fewer ill effects, might be stated as additional factors in its favor.

The author's method of administration of the cinchona is partly in the form of impalpable powder tightly packed in cachets, each of which may carry 0.75 gm. of the drug. Four of these cachets representing 3 gm. of the powder are taken daily and, in addition, 120 ml. of a decoction, representing 6 gm. of the

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(10) Paris méd., May 4, 1918.

powder, and produced by boiling 50 gm. of finely pulverized cinchona with an equal amount of licorice root in 1,000 ml. of water for 3/4 of an hour, and adding enough water after cooling and straining to make a total of 1 liter. Of late, the author has added 2 gm. of citric or tartaric acid to each liter to favor extraction of the alkaloids. The total dose representing 9 grams of cinchona, is taken once daily, irrespective of the time of the expected chill. After the dose is swallowed, the patient may chew a piece of licorice root to remove the bitterness from his mouth.

[While the addition of the acid to the decoction may favor extraction of the alkaloids, it is likely to destroy the disguising value of the licorice root.—Ed.]

Intramuscular Administration of Quinine in the Treatment of Malaria. Léenhardt and L. Tixier[1] claim that the intramuscular injection of quinine offers the following important advantages: First, the immediate disappearance of all paroxysms, as well as of all the hematozoa from the blood. Among 453 patients they had only 12 who had an attack during the course of the treatment, and in only 4 patients did crescents continue to form in the blood. Secondly, the certainty of absorption of the administered quinine. Thirdly, greater interval between dosage; one injection every day to every fourth day, instead of at least two doses a day, when the treatment is given by stomach. Fourth, the digestive functions are not disturbed, the inconstant and transient pain produced by the intramuscular injection can not, in the opinion of the authors, be considered to overbalance the digestive troubles produced by the gastric administration of quinine. Fifth, greater efficacy of the treatment in spite of much smaller doses of quinine. The enormous saving of quinine realized by this method at this time, when the price of this drug is so high, is also a matter worthy of consideration.

The objections raised against these injections, that they are extremely painful, that they produce suppuration, and even sloughing, followed by large scars or fibrous nodes, and the production of obstinate neuralgias,

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(1) Presse méd., March 4, 1918.

or of sciatica, are all due to faulty technique. These things do not occur if asepsis is faultless, the injection is not too superficial, and if it is made at the point of the election. However, they should not be given by a nurse or attendant, but by the physician himself.

The authors recommend the following solution, which is put up in ampoules for use of the army medical service.

Quinine hydrochloride	0.40 gm.
Urethane	0.20 gm.
Water, to make	1.00 ml.

The most rigorous asepsis must be practiced, such as boiling the instruments, and disinfecting the skin with tincture of iodine. The needle must be introduced into a pliant area of muscle, well outside the zone of induration of the previous injections. The injection must be given into the body of the muscle by means of a needle which is inserted for more than three centimeters. The points of election lie above the transverse line passing through the upper end of the furrow between nates. The injections are best tolerated when they are given into the upper and inner portion of the buttocks. Of course, one must guard against the injection into a vein, by introducing the needle first; and, after waiting a few seconds to be sure that no blood escapes from it, one attaches the syringe containing the quinine. It is also well to gently aspirate before one injects.

Among the immediate effects of such injections the authors have noted occasionally a tendency to syncope, which is liable to follow any puncture in feeble or emotional subjects. Among the late accidents, induration and tenderness about the area of injection for several days occasionally occurs. But it is rarely sufficient to require moist applications. Among, 8,000 injections, which the authors gave in a period of seven months, they have not had any suppuration; and, only once, the development of a hemotoma with secondary sloughing.

During the period of attacks, the treatment should be intensive. It is necessary to give, as soon as possible, an intramuscular injection of 0.80 gm. of quinine hydrochloride. These injections should be repeated daily for six days, if possible at the some hour. While the first injection may not suppress the attack coming on that day, one can always be sure that after the second injection, major paroxysms will not appear. After the attacks have been suppressed, the treatment may be less intense. However, it should still be systematic. As in all diseases due to protozoa, long continued treatment with a series of injections separated by intervals are indispensable to triumph over the resistant forms of the parasites, which remain after the attacks much more commonly than is generally thought. The authors' experience has shown that an intramuscular injection of 0.80 of quinine hydrochloride every fourth day is sufficient to secure freedom from the recurrence of attacks. This treatment should be continued for four to six weeks; and, before the patient leaves the hospital, it is well to give six injections more closely together. In severer cases, the injections may be given every second or third day.

By a study of the elimination of quinine in the urine, Jeanselme and Dalimier[2] have determined that intravenous injections cause the immediate appearance of quinine in the urine, which reached its maximum in from four to six hours, and lasts an average of twenty-seven hours. When given by stomach it appears in twenty-five minutes, reaches its maximum in five to six hours, and disappears at an average of thirty hours. While when given intramuscularly, in aqueous solution, the quinine appears in the urine in fifteen minutes, reaches its maximum in six hours and lasts for fifty hours. Contrary to expectations, quinine introduced in oil suspension is not eliminated much more slowly than quinine given in aqueous solution. The conclusion of the authors is that, in order to have continuous quininization of the patient, it is necessary to administer intravenous injections or gastric doses daily, while, if the quinine is introduced intramuscularly, an interval of forty-eight hours between the injections suffices.

It is necessary to note that the absorption is much interfered with, if the injection is made in a muscular area indurated by reason of a previous injection. The

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(2) Presse méd., Aug. 2, 1917.

induration can be minimized by using a dilute solution of quinine, or by injecting the standard solution extremely slowly.

The Technique for the Administration of Large Doses of Quinine by Hypodermoclysis in the Treatment of Malaria, as practiced by Professor Pende[3] of the University of Palermo, is described in the "Lancet" of Dec. 29, 1917, as follows: "The method consists in a hypodermoclysis, repeated every 5-6 days for 4-5 times, of 250 ml. of physiologic salt solution, to which are added 2 grams of bihydrochloride of quinine, and a half a cubic centimeter of 1 to 1,000 solution of adrenaline. The technique is very simple. The middle of the anterior external part of the thigh being selected as the most favorable site for the injection, the fluid being held about 6 feet above the ground penetrates the tissues in 10-20 minutes and causes no pain; absorption is rapid as the drug can be detected in the urine about an hour afterwards. The first injection is given, if possible, 6-7 hours previous to an attack and is followed by a second in 15-24 hours; on the fifth to sixth day a third is given, and after a further 5-6 days, a fourth, always in the same dose of 2 grams, equivalent to 1.60 grams of pure alkaloid. A week after the fourth injection quinine is given by mouth in doses of 2-3 grams a day in 6-9 powders, for two days in succession every week for a couple of months, arsenic and iron being given on the intervening days. The effect of the treatment is that in the majority of cases the temperature falls completely, sometimes with a rapidity very striking in severe forms which have resisted previous treatment by quinine by mouth or ordinary hypodermic injection. Sometimes there is a modified abortive attack one or two days after the second hypodermoclysis, followed by complete apyrexia. After about three months a perfect clinical cure results."

There appear to be no contraindications to these heroic doses of quinine in subjects free from organic disease of the circulatory system or kidneys. The addition of adrenaline serves to counteract vasomotor collapse which might be apprehended from such large doses

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(3) Policlinico, Nov. 4, 1917.

of the alkaloid in subjects specially predisposed to vascular atony.

Intravenous Injection of Quinine in the Treatment of Chronic Malaria. Jack Witherspoon[4] reports a series of five cases of chronic malaria that had resisted ordinary quinine medication, cured by the intravenous injection of 0.6 gm. quinine bihydrochloride in 15 ml. of distilled water every second day for two weeks. In one case he gave the injections daily for five doses, then on alternate days for five more doses. Blood examinations were made in each case and the parasites repeatedly demonstrated before the treatment was instituted. In no case could the parasites be found after the treatment.

MacGilchrist, in test-tube hemolysis tests, found that a 15 per cent. solution of quinine in blood would cause a jellylike substance to be thrown down which he thought would result in thrombus and embolus. Hemolysis may occur at 1-to-12 or 1-to-13 solution. Hence for intravenous injection one should use quinine in large amounts of water or saline, *e. g.,* 0.60 to 1.00 gm. to 20 ml. of water, freshly distilled. If in intensive medication by the intravenous method we have a treatment which will clear up a chronic malaria in a few days, we have at hand a valuable method that should be more frequently used.

[That MacGilchrist's experiments *in vitro* do not hold for intravenous injection *in vivo* is brought out by the following report.—ED.]

The Suitability of Various Salts of Quinine for Intravenous Injection has been studied by Leonard Rogers.[5] As a result of these studies, he can not agree with MacGilchrist (1914) who expressed the opinion that quinine salts are unsuitable for intravenous injection except in the extreme dilution of a single dose in several hundred mils of saline, because even in considerable dilution they caused gelatination or precipitation of blood serum on standing. As, however, says Rogers, solutions when injected intravenously do not stand in the blood, but are very greatly diluted within a few

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(4) Jour. Tenn. Med. Ass'n., December, 1916.
(5) Brit. Med. Jour., Sept. 22, 1917.

seconds, the immediate effect of given dilutions of the alkaloids on serum appears of much greater importance. As a result of experiments on this question, **Rogers** is able to state that, with the exception of quinine lactate and periodide and hydroquinine hydrochloride, all those tested are likely to be safe for intravenous injection in concentrations of at least 1 in 10, which would allow of 1 gram being given in 10 ml., and so make the intravenous method quite convenient clinically. **Rogers** has tried the bi-hydrochloride and the acid hydrobromide intravenously in fever cases, and found that the bromide salt can be given in doses 1 gram to adults without producing much dizziness although half that amount of the bi-hydrochloride intravenously commonly produces cinchonism. In all probability the bromide radicle counteracts, to some extent, the action of quinine on the nervous system. The bi-hydrochloride and the acid hydrobromide in 0.5 gram doses once a day for three or four days do not produce more rapid disappearance of the fever and of the parasites than does quinine by the mouth. As three parts of the bi-hydrochloride contain as much quinine as four of the acid hydrobromide, after commencing with 0.5 gram doses, to ascertain whether the patient has any idiosyncrasy towards the drug, up to 0.75 gm. of the bi-hydrochloride or 1 gram of the acid hydrobromide, in 7.5 or 10 ml. respectively of normal saline may be given once daily for at least four days. In any case prolonged oral administration should follow the more active intravenous medication. Once repeated relapses have become established, the only method of treatment which has given satisfactory results is the daily administration of 0.60 gm. of quinine in one or two doses for at least three, and preferably six months always continuing until the end of the malarial season if in an endemic area.

Galyl and Quinine in the Treatment of Subtertian Cerebral Malaria. A. W. Falconer and A. G. Anderson[6] report a series of six quinine-resistant serious cases of subtertian malaria, all improved by treatment with a combination of quinine and galyl, excepting one patient who died. They used quinine bi-hydrochloride 0.8 gm.

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(6) Lancet, Sept. 29, 1917.

intramuscularly and intravenously. If no improvement was obtained, they used 0.2 to 0.4 gm. galyl intravenously, in addition. They also cite two cases showing that galyl alone can cause the disappearance of the ring forms of parasite from the peripheral blood-stream. They conclude that the treatment in itself is free from danger, that in subtertian malaria which is resisting adequate quinine treatment, or where the condition is sufficiently alarming, the results of the combined galyl and quinine treatment have been encouraging enough to justify a further trial. It must be thoroughly understood, however, that the addition of galyl in no way diminishes the necessity for quinine. In cases in which, on account of idiosyncrasy, quinine is impossible a valuable substitute may be found in galyl.

Negative Results from the Intravenous Use of Tartar Emetic in Treatment of Malaria. Such have been obtained by M. D. Levy and D. P. Wall[7] who tested the value of tartar emetic in some ten cases of estivo-autumnal infection, with uniformly negative results so far as freeing the blood of parasites was concerned. Its effect on the other symptoms and signs was also practically negligible. In all the cases a fresh 2 per cent. solution of tartar emetic was used, being sterilized by boiling just before administration. The author used doses of 1 or 2 ml. intravenously and increased the dosage up to 6 ml. administering treatment intravenously twice a week. Leakage into the subcutaneous tissues produced a hard brawny swelling and herpetic like lesions around the site of injection.

ALLEGED SPECIFICS.

QUININE IN PNEUMONIA.

Quinine with Pituitrin and Digitalis in the Treatment of Pneumonia. Solomon Solis-Cohen[8] gives the following directions for his "definite" plan of treatment of this disease. When circumstances permit, it is advisable to give at least the first dose of quinine by

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(7) Interstate Med. Jour., March, 1918.
(8) New York Med. Jour., June 8, 1918.

aseptic intravenous injection; otherwise by intramuscular injection through iodized skin and with proper precautions. Subsequent doses may be given in the same way as the first or by the mouth. If the injection methods are impracticable, oral administration may be used at first and throughout; but its effects are less prompt. For intravenous and intramuscular injection, Cohen prefers the quinine and urea hydrochloride. For oral administration, he prefers either the quinine and urea hydrochloride or the dihydrobromide, encapsulated.

The initial dose by the mouth for a young, robust adult should be no less than 1.6 grams; by intramuscular injection, not less than 1 gram in extemporaneous 50 per cent. solution in boiling water; by the vein, not less than 0.6 gram in from 0.5 to 1 per cent. solution, in distilled water, or in saline solution. These quantities may be exceeded in so-called sthenic cases, with high fever and hard, pounding pulse. For the aged and for children of fifteen years or less, they should be reduced about one-half.

The first dose, however, is tentative; and, upon its effect, as shown within three hours, will depend the size of the second dose and the frequency of repetition. For a convenient index of effect, the temperature curve is taken; and, in the absence of contra-indication, the standard dose of 0.6 to 1.6 grams is repeated every third hour by vein, muscle or mouth, until the temperature falls some two to three degrees to about 102° F., and remains at or below that (approximate) figure. After that the drug is given every fourth hour, or every sixth hour, or at longer periods, as may be required to maintain the effect. Also, the size of the dose is varied in accordance with the degree of influence, and the apparent needs and reactions of the individual patient being increased or diminished—and usually diminished—as circumstances may indicate. In other words, individualization, which is part of all rational therapeutics, applies here as everywhere. At times a dose of 0.30 to 0.60 gm. by the mouth is given routinely every third hour, even if the temperature falls below 102°F.; if the temperature is only 102°F. to begin with, the initial dose is given nevertheless. The aim is to get the patient under the complete influence of quinine as soon as possible. In this connection, emphasis must be laid upon the fact that pneumonia patients exhibit a peculiar tolerance toward quinine. Owing to the tendency of quinine as well as of pneumonia to produce a lowering of blood-pressure, Cohen considers the simultaneous use of pressor agents of great importance. Of these, pituitrin 1 ml. of the commercial solution is considered the most important. So long as the systolic pressure curve is less than five points higher than the pulse curve, the pituitary injections are repeated every third hour. If greater effect seems required, cocaine 0.03 to 0.06 gm. is given alternately or cocaine, camphorated oil (two mils, of the 20 per cent. solution) and pituitrin are used in succession, one or the other hourly. Subjects of arteriosclerosis, may be given the benefit of their abnormal arterial pressure; pituitary and its auxiliaries being omitted.

The author also employs digitalis, basing its use upon an observation concerning the relation between the diastolic pressure curve (charted in the millimeters of mercury) and the respiration curve (in excursions per minute) somewhat similar to the Gibson (pulse systolic pressure) ratio. Danger is indicated by approximation of these curves—*i. e.*, a descent of the diastolic pressure curve to sixty, or an interval of less than ten points between it and the respiration curve, irrespeetive of the exact figures of either. A dose equivalent to twenty minims of a good tincture of digitalis is injected at the beginning of the treatment, and repeated thereafter every third hour (or less frequently) so long as may be necessary to maintain the interval of ten points between diastolic pressure and respiration frequency, or to keep the curve of the former above sixty irrespective of the respiration. The fact that digitalis effects are slow to appear must be kept in mind, especially when oral instead of hypodermic administration is employed, also that the dose by mouth is doubled.

In addition to this, Cohen uses alkaline saline beverage or infusion, so that chlorides be supplied and the urine kept continuously alkaline, with an excretion of not less than 2,000 and if possible 3,000 mils daily. Of course whatever symptomatic treatment is required, is used, in addition.

Furthermore, he insists, "A combination of bacterin, serum—so far as available—and the measures of the definite treatment applied with individualizing discretion, would probably be better than any of these methods alone."

"In warfare, no sane general restricts himself to infantry, artillery or cavalry, or to a particular type of cannon. Each arm, each force, is employed where it can do most good—and, if the first choice is not at hand, another is used. Should a sane physician then restrict himself to a single class or type of therapeutic agents in his battle with the Goths and Huns of the microscopic world?"

The Value of Quinine-Urea in Pneumonia. Twenty-four cases of lobar pneumonia were treated by Edwin Matthew.[9] The drug was used by intramuscular injection into the buttocks. Large doses were given—1 gm. every three hours for as many times as seemed necessary. All but one patient had three doses in the first nine hours after admission. If after these initial doses the temperature rises again to above 102° F., the drug should be continued every three hours as before, until a crisis is reached. Administration should be begun at once, and undoubtedly the best results were obtained in cases admitted early in the disease. One patient had twenty-two doses. No toxic effects were produced in any cases. The immediate effect after two or three injections of quinine-urea is a marked fall in the temperature in almost all cases. The fall is usually very considerable, it may be to subnormal, and takes place within about eight hours after the second or third injection. It is accompanied by a corresponding fall in pulse and respiration rate, and the patient's symptoms are markedly relieved. The mortality rate of the twenty-four cases thus treated was 8.3 per cent. as compared with mortality rates of 13 to 32 per cent. during the seven years previously. The author is willing to admit that "the same end-results might have been attained with the ordinary expectant treatment of

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(9) Edinburgh Med. Jour., April, 1918.

pneumonia. Even if this be granted, there are undoubted benefits derived from the use of quinine-urea which are observed during the course of the disease, and these alone would justify its use. Thus, four of the patients were extremely delirious on admission, very restless and looking very ill. After three injections of quinine-urea they became quite quiet and sensible, and all toxic phenomena had disappeared. In all cases the breathing becomes much easier, and all irritability and restlessness is checked. The distressing cough of pneumonia is relieved. Sleeplessness disappears, and in only a few cases are hypnotics required. The patients require much less nursing attention and the convalescence is quick, the involved lung clearing up very quickly. The blood-pressure is always well maintained." Matthew considers this treatment a distinct improvement over the usual expectant therapy. Camphor which he used in twenty other cases failed to prove of value.

CHEMOTHERAPY OF TUBERCULOSIS.

Copper and Potassium Cyanide in the Treatment of Pulmonary Tuberculosis. In last year's Vol. VIII. of the Practical Medicine Series, the work of Koga on the chemotherapy of tuberculosis with a double salt of copper and potassium cyanide was reported. George H. Evans[10] used this salt in ten patients out of a series of about seventy beds. Inasmuch as the service in this department is for the reception of late cases only, the preparation was put to a rather severe test. It was used in doses varying from eight to twenty-one milligrams; and was invariably given intravenously, a vein in the elbow being chosen. The patients were confined to bed during the first week following each injection, some of them during the entire course of treatment. Those who were allowed up were strictly limited as to their activity. The injections were administered at intervals of two weeks, following the plan of Dr. Koga.

Of the ten patients treated, one died. The results in the others are summarized as follows: There was little

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(10) Med. Rec., Oct. 6, 1917.

evidence of general reaction, five cases experienced chills which were in no instances severe. Rise in temperature was unusual. Two cases had slight temperature increases accompanied by a slight rise in the pulse rate and the number of leukocytes. It subsided again in four days. Evidence of focal reaction was very frequent, and was present to a greater or lesser extent in all patients save in the one who died. All the cases, except the fatal one, showed increase in râles after one or more injections. In the majority of the cases there was increase in cough following the injection, sometimes so severe as to require heroin for its relief. This was in quite a number of instances accompanied by an increase in the amount of sputum, and frequently traces of blood appeared. The sputum was carefully and frequently examined during treatment with reference to bacillary content; but the count decreased in as great a number of cases as it increased. There was pleural pain following most of the injections, sometimes very severe. All of these patients, except one, showed some increase in weight; not marked in any excepting in one case. Most of these patients, in fact, all of them now under observation except one who had a severe focal reaction following the first injection and with whom the prognosis was decidedly bad at the start, lay claim to a feeling of improvement and well-being entirely irreconcilable with the physical findings.

The author arrives at the conclusion that copper and potassium cyanide in amounts from 8 to 12 mg. is not followed by injurious results in cases of uncomplicated pulmonary tuberculosis, that large doses, or even smaller ones in complicated cases or those presenting extensive active lesions with fever, may produce serious focal reactions causing permanent harm. The value of the preparation in the treatment of pulmonary tuberculosis has not been conclusively demonstrated. However, its further trial in the treatment of this disease is justifiable.

A Tubercle Bacillus-Destroying Compound. V. von Unruh[1] believes that he has produced such an one, composed of the active principles of inula and echinacea.

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(1) Med. Rec., Nov. 17, 1917.

White inula exerts a direct destructive influence upon the tubercle bacillus, a solution of 1:10,000 of helenin, its active principle, inhibiting the growth of the tubercle bacillus, echinacea corrects the leucopenia. V. von Unruh believes that the leukocytes are directly stimulated by echinacea, their activity is increased, the percentage among the different classes of neutrophiles is rendered normal, and phagocytosis is thus raised to its highest protective capacity. As many as eight bacilli enclosed within one phagocyte were repeatedly counted, and this in cases in which at the beginning of treatment the third class of neutrophiles had been from 10 to 20 per cent. less than the second class. By favorably influencing phagocytosis the number of bacilli is also diminished.

John Uri Loyd of Cincinnati prepared for the author a compound of these two drugs in a colloidal fluid form, containing no free alcohol. In 3 ml. of the compound inula represents 1.33 ml. and echinacea 1.0 ml. The compound is administered by intravenous or intramuscular injection. Intramuscular injections are given daily into the glutei or infrascapular muscles as frequently as is tolerated, each injection carrying from 3 to 8 ml. of the compound. Intravenous injections carry from 10 to 30 ml. of the compound, undiluted, and are given into the veins of the elbow or those of the ankle three times a week. The compound used in this manner is absolutely non-toxic. Dilutions of the compound, 1:1,000 in distilled water, will inhibit the growth and render sterile cultures of tubercle bacilli. Inoculations of guinea-pigs with cultures thus treated proved negative in every case, twenty-five animals having been used.

The author inoculated fifteen guinea-pigs with tuberculous sputum, keeping back five others as controls. Of the fifteen animals inoculated fourteen showed the characteristic symptoms of tuberculosis. An arrest of the disease was attained in ten of the fourteen infected animals treated by injections with the compound, the dose varying between 2 and 5 ml. for each injection. The four remaining animals died.

Von Unruh claims that more than two hundred cases of tuberculosis have been treated up to the present time with this compound. Of this number 150 were treated by him, the rest by other physicians in all parts of the United States. Of four glandular cases two were arrested while two showed no improvement. In incipient pulmonary cases 100 per cent. of recoveries was obtained. Some of these required only from two to four weeks of treatment, while in others it was necessary to continue treatment for two to four months before arrest of the disease was accomplished. Of moderately advanced cases about 50 per cent. were arrested when their general intoxication was not too profound. Profoundly intoxicated cases and far advanced cases did not yield any results with this method.

RESTORATIVE THERAPY.

Under this heading will be discussed those remedial measures the aim of which is the production of remedial physical or chemical changes in the tissues.

PROTECTIVES.

Perforated Paraffin Paper for Surgical Dressings is advocated by C. C. Booth,[2] who points out that imperforate paraffin paper interferes with drainage. He found that, if this wax paper was perforated every quarter of an inch with a No. 4 eyelet punch (which can be bought very cheaply in any hardware store, and some twenty thicknesses of paper can be perforated at one punch) it served the purpose admirably. This perforated paper allows ample drainage and, at the same time, furnishes ample protection to granulation. It is not removed until the wound is healed, unless it becomes loosened. Booth uses it on all kinds of granulating wounds.

Paraffin-Gutta Percha Dressing for Wounds and Burns. Madame Bouet-Henry[3] recommends a mixture

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(2) Jour. Amer. Med. Ass'n., July 6, 1918.
(3) Jour. de méd. et de chir. prat., Feb. 10, 1918.

of paraffin of a melting point between 42 and 45 degrees C. with 5 per cent. gutta percha, as not only an excellent dressing for raw surfaces but also as a means of applying heat, for this mixture may be used at a temperature of 70 to 90 degrees, without danger of burning, and it will maintain this temperature for a remarkably long time. The dressing is painless, supple, and exerts an elastic compression.

SOLVENTS.

A Solvent for Plugs of Wax, etc., in the Ear. E. Cronzel[4] recommends the following mixture for the purpose of softening these plugs, which, owing to variation in composition must be attacked by a polyvalent solvent. Such a one is obtained by means of the following formula:

Aqua ammonia	1 part
Sterilized [?—Ed.] poppy seed oil	9 parts
Ether	9 parts
Eucalyptol	1 part

Shake vigorously the first two ingredients in a flask for about ten minutes to produce a soap, warm gently in a water bath to expel excess of ammonia. After cooling, add the other two ingredients; and shake well. Must be well shaken each time before using.

A pledget of absorbent cotton, saturated with the mixture is introduced into the meatus. Pressure with the index finger upon the tragus squeezes the liquid into the canal. This is repeated two or three times a day for several days, when the liquified plug is easily removed.

DESTRUCTIVE AGENTS.

Of late, quite a number of drugs, that are not generally classed as escharstic, has been used for the purpose of producing destruction of pathologic tissue, most especially by means of injection into it. Though the

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(4) Jour. de méd. et de chir. prat., April 10, 1918, from Répertoire de pharmacie.

knife has, to a great extent, replaced the caustic, it seems within the domain of possibility that the more subtle destructive agents might, in course of time, replace the knife, at least in part. Should this development take place, it would not only be welcomed by the vast majority of patients, but by the general practitioner as well; though it is probable that the safe and successful use of these agents may require greater skill than does the handling of the knife.

QUININE AND UREA HYDROCHLORIDE.

It was soon noted by those who employed this substance by injection for purposes of local anesthesia, that solutions stronger than 0.25 per cent. may produce fibrous indurations. This fibrosis is made use of for therapeutic purposes in the below described applications of this substance. Its antiseptic property renders these injections comparatively safe, as far as the introduction of infection is concerned; and its prolonged anesthetic action renders the stage of reactionary inflammation, so distressing with many other destructive agents, comparatively painless. The harmlessness of this agent after absorption is another important quality in its favor.

Quinine and Urea in the Treatment of Hemorrhoids. E. H. Terrell[5] has treated in this way up to the time of this report, a total of 313 patients. On the basis of this experience, Terrell states that quinine and urea should not be used in inflamed, strangulated or external piles, but that it is a specific in that large class of chronic internal hemorrhoids, the chief symptoms of which are protrusion and bleeding. A hemorrhoid that is badly ulcerated and bleeds freely will seldom bleed again after the first treatment. About 50 per cent of those with protrusion are relieved of this symptom immediately after all the tumors have received one injection. With those hemorrhoids situated lower in the anal canal, the prolapse will disappear gradually, although a marked reduction will be noticed from the beginning of treatment.

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(5) Jour. Amer. Med. Ass'n., Nov. 3, 1917.

Terrell has come to the conclusion that 5 per cent. is approximately the right strength for the average case. Sometimes, if a hemorrhoid seems resistant to treatment, as occasionally does, the author used a 10 per cent. solution with better results. He injects one hemorrhoid each succeeding day until all are treated; but, if the sphincters are relaxed, there is no objection to treating two or more hemorrhoids at one time. After all the hemorrhoids have received a treatment, the patient is asked to return once a week until a cure is effected, which takes about six weeks for the average case. At these visits, treatments are alternated from one side to the other, that is, the piles on the right side are injected at one visit and those on the left at the next, so that each hemorrhoid is treated once every two weeks, which, the author thinks, ordinarily is often enough. There is no attempt to dilate the sphincters, nor does he draw the hemorrhoids down, as is advised by some operators. He finds the Brinkerhoff anal speculum the instrument of choice in bringing the tumors into view. It is small, conical in shape, and very easily introduced.

The technique of injection is described as follows: "The pile selected for treatment is cleansed with an antiseptic solution, preferably iodine and alcohol. Enough of the quinine and urea solution is then injected into the pile to distend it slightly. The needle must be very small and should be inserted at a point as far away from the skin margin as possible, the slide in the speculum being used as an aid in doing this. The injection should be made through and not into the mucous membrane; otherwise a slough is likely to occur." During the course of treatment there are no restrictions whatever placed on the patient. He is allowed to proceed about his business as usual.

Inasmuch as most of those suffering with hemorrhoids are more or less constipated, and since the latter condition most often precedes and is the cause of the former, it is necessary that the treatment of both be taken up at the same time. Relief from constipation, when possible, is a decided aid in the treatment of the hemorrhoids, and the author has been greatly surprised to find how easily many cases of long-standing constipation are relieved when their hemorrhoids are being taken care of. If the work is done carefully, gently, and without haste, 90 per cent. of the patients, will not know when the injections are made. During the past year, among 185 patients, three have had pain due to complications; in one due to an edema of the skin below the point of injection probably because the injection was made too near the skin line; in the second there developed a well marked fissure; in the third, there occurred a small marginal abscess a short time after the first visit. Every patient treated by the method described has been cured; though sometimes as long as twelve or fourteen weeks were required for a complete disappearance. Hard fibrous hemorrhoids would persist in spite of such treatment. In most of the cases with this complication, unless very slight, operation at the hospital should be advised, when a complete removal of all the hemorrhoids is done.

The author concludes that the treatment of hemorrhoids by the injection of quinine and urea appears simple, and it is; but a thorough knowledge of rectal diseases is essential if one expects uniformly good results. Most important of all is a realization of the class of cases to which it is suited, and its limitations. He hopes no physician will attempt to use the remedy until these ideas are thoroughly grasped.

[That the above described method is not devoid of danger, is shown by the following report.]

Fatal Result Following Injection Treatment of Hemorrhoids. H. J. Spencer[6] reports the case of a man, aged 38, who had had external and internal hemorrhoids, which had bled for six years. In a dispensary three large internal hemorrhoids were injected with quinine and urea hydrochloride. They later sloughed off. That night, he had a severe headache; the next, a severe chill. These symptoms recurred to the end. Pain in the right hypochondrium commenced the fourth day. By the sixth day, the patient was obviously septic; by the seventh day, the liver and spleen were palpable. The patient died on the twelfth day. Necropsy revealed ulcers of the rectum, following

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(6) Jour. Amer. Med. Ass'n., Jan. 26, 1918.

necrosis of internal hemorrhoids; phlebitis of the prostatic and possibly of the hemorrhoidal veins; thrombosis of the same veins; multiple abscesses of the liver; septic infarct of the lungs, chronic pulmonary tuberculosis, which, however, was obsolete; parenchymatous degeneration of the heart, liver, kidneys, etc., and infection by *Bacillus aërogenes capsulatus.*

The author points out that the rectal mucosa cannot be effectively freed from pathogenic organisms, which may be carried deeper by a hypodermic needle. The liquid injected reduces tissue resistance, and furnishes a good medium for the growth of organisms. If an anesthetic agent is injected, pain and the defensive reflexes that might be aroused are abolished. Hence, the mechanical spread of the infection is unretarded. The patient's walking, jolting in cars, and sitting in chairs, all aid in spreading the infection. Dispensary patients, therefore, are subjected to a double risk.

EMETINE.

Action of Emetine on Malignant Tumors. Richard Lewisohn[7] tested the effect of emetine (alkaloid) on malignant tumors in consonance with the theory that these neoplasms are of parasitic, possibly amebic origin. The results obtained in human beings seemed rather promising; but because of the many pitfalls in this special field of work, the author tested the drug extensively on tumors of rats and mice before he drew definite conclusions. The experiments have shown that emetine has no specific effect on malignant tumors. While carcinomas and sarcomas in rats and mice treated by injections into the tumor underwent necrosis and scab formation; and, in the majority of cases, the scab fell off after a week, leaving an indurated area and sometimes an area of alopecia as the only indication of the former site of the tumor, the disappearance of the tumors is evidently based on the cell-destructive action of the emetine. This destruction is not limited to the tumor-bearing area, but extends to the surrounding tis-

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(7) Jour. Amer. Med. Ass'n., Jan. 5, 1918.

sues, thus preventing the proper nutrition of the tumors and establishing another factor for the disappearance of the growth. The action of the drug is purely caustic, similar, though in less degree, to the action of phenol, zinc chloride, etc. Repeated intravenous injections of emetine do not affect the growth of carcinomas and sarcomas. This proves conclusively that emetine has no specific effect on the growth of malignant tumors.

RADIUM.

Radium in the Treatment of Cancer of the Lip. Henry H. Janeway[8] reports that if it is justifiable to treat any form of early cancer by radium instead of by operation, it is cancer of the lip. He reports twenty-four cases, eight of which were superficial early cancerous lesions, without deep invasion of the muscle. As might be expected, there were no therapeutic failures among the eight superficial lesions. The duration of the disease before treatment, apart from the character of the growth, has little bearing on the prognosis. Two of the eight early cancerous lesions were stated to have begun to develop four years before treatment. The critical factor is the rate at which the lesion is growing at the time of the treatment.

"It is of much importance, he says, "to recognize what constitutes a beginning or early cancerous lesion of the lip, and that such lesions uncured have all the potential life-destroying power of established cancer. This stage is the most favorable time in which to treat cancer. No more important progress in the therapeutics of cancer could be made than so improving both diagnostic methods and the education of the public that a larger and larger proportion of patients can be treated in the early stage. It is a stage easily recognized on the skin and lip, less easily inside the mouth, where the surfaces are moist and more hidden, and almost impossible of detection in many other locations. It nevertheless should be the aim of medical science to accomplish the treatment of cancer in this early stage."

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(8) Jour. Amer. Med. Ass'n., April 13, 1918.

"It is the stage above all others in which radium can be counted on to be successful, a remedy toward which patients will not hesitate to turn, as they so often avoid the knife. A single treatment in experienced hands will produce a cure."

The sixteen remaining cases of unquestionably deep lesions, have also been healed with the exception of three cases now under treatment, in all of which the prognosis is doubtful because all three patients had advanced lesions when they applied for treatment.

The degree of success Janeway has obtained in the treatment of operable cancer of the lip by radium justifies a continuation of the use of radium in operable cancer of the lip. This method of treatment includes the careful observation of patients after treatment for the possible development of metastatic lymph nodes, and the operative removal of such when they occur, with the implantation of radium in the wound.

Janeway recommends the application of radium emanation embedded in molds of the dental compound, and filtered through the thinnest material for the most superficial lesions. As a matter of convenience, he has used 0.5 mm. of silver uniformly for all but the lesions with deep infiltration. While 0.5 mm. of silver has been unnecessarily heavy for the most superficial lesions, it has given uniformly satisfactory results in his cases. For the deeper lesions, however, nothing has surpassed the progressive, smooth and complete retrogression produced by filtration through 1 mm. of platinum. The tubes should be sunk 5 mm. in the dental compound, and for the ordinary lesion the dose should be 60 millicurie hours per square centimeter, when the filtration is through 0.5 mm. of silver, and 100 millcurie hours per square centimeter when through 1 mm. of platinum.

"The use of emanation instead of radium element facilitates uniform distribution over the lesion. Provision for uniform distribution is the most important factor in obtaining a successful result. It is true that it is possible to approach the uniform distribution obtained by emanation with the radium element, provided this is put up in many tubes; but few users of radium element find it practical to divide their radium thus, and the attempt to treat these lesions by merely placing on them single tubes of radium element is inaccurate and often inadequate."

"The superior adaptability of radium emanation for the treatment of cancer makes the use of the element itself obsolete, and for the vast majority of cancers, it is inefficient."

Hemostatic action has been obtained from radium in uterine hemorrhage at the menopause; as is, for instance, reported by T. J. Watkins,[9] who details two such cases cured by the following method: The patient is anesthetized, with nitrous oxide, the uterus explored and curetted for diagnostic purposes. A capsule containing 50 milligrams of radium screened by a small silver as well as a gold capsule, which latter is covered by rubber to which a strong silk cord is attached to guard against loss is employed. The capsule is sterilized by immersion in carbolic acid, then alcohol and dipping in tincture of iodine prior to insertion in the uterus. The radium may be left in the uterine cavity for twenty-four hours. Nausea and vomiting and a feeling of exhaustion for a few days are occasional results. Watkins believes that 1 to 2 grams of sodium bicarbonate four times daily lessens some of these disturbances. Bleeding for a few days and increased leukorrheal discharge for two or three weeks not uncommonly follow this treatment. A cure of the hemorrhagic tendency may however be obtained in some of these cases in which prior to the use of this method, hysterectomy would have had to have been performed. Regarding the mode of action of radium in this condition, Watkins believes that it is probably due to destruction of the Graafian follicles, though changes in the endometrium and the blood-vessels of the uterus, are also probably of importance, as the radium causes increase in the amount of connective tissue at the expense of epithelium and it also obliterates small blood-vessels.

[In a case, thus treated, hemorrhage recurred after complete cessation for one year, but was again checked by reapplication of the radium.—ED.]

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(9) Surg. Clin. of Chicago, October, 1917.

DIATHERMY.

Diathermy in Cancer. Albert C. Geyser[10] believes that the poor results from surgery in the treatment of cancer, might—in view of the fact that even the removal of a small piece for microscopic examination is fraught with serious danger—be assumed to be due to the fact that, just as soon as previously unused avenues are opened with the knife for the absorption of the "cancer juice," metastases are apt to follow. For that reason the surgeon attempts to find safety in the radical operation, by cutting far and wide from the real growth. Even this radical operation, much better than the mere removal of the tumors, nevertheless is not all that could be desired.

Hence it is necessary to get away from the cutting process entirely. The cancerous area must not be made to bleed. It is better to burn it away. Since 1910, the author has treated all kinds of malignant growth by the application of the diathermic current, employing a current which causes the parts to maintain, for an hour daily, a temperature of 108° F.

All of his early patients are alive, they have not been mutilated, they are not now aware of the usual consequences which always accompany malignant growths. The only drawback so far of this method is that it is not applicable to any of the internal growths. As long as the growth is so situated that contact can be maintained with at least one of the electrodes, there is every reason for expecting good results. Of all the normal cavities, cancers of the mouth are the least favorable on account of the mechanical difficulties to be overcome. Cancer of the breast has responded best when the growth could be enclosed between the two electrodes.

COUNTERIRRITATION.

[This procedure may become rescued from the disuse into which it has fallen, when it will be appreciated that, especially when used in one of the forms described

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(10) New York Med. Jour., Feb. 2, 1918.

below, it might be considered a means of inducing leukocytosis, with all the therapeutic possibilities of the latter.—Ed.]

The Technique of Continuous Counter-Irritation. This is described in detail by W. J. Midelton,[1] who considers it especially valuable in rheumatoid arthritis, in which condition it will usually produce lasting relief of pain that has resisted all other means of treatment, and restore sleep. The author gives the following details of technique:

(a) Blister Followed by Savin Ointment. A blister, 4 in. by 3 in., is applied as nearly as possible in the region of the cervical and lumbar enlargements of the spinal cord. In a thin patient, it may be divided into two parts, one being placed on each side of the vertebral spines. A large pad of cotton wool is placed over the blister when on measuring, say, 10 in. by 10 in., and on this a piece of guttapercha tissue or other waterproof material, the whole being kept in place by means of a broad bandage or other device. The author uses a square piece of lint or flannelette, with braces attached to the upper border and bands to the lowest part of the sides. This saves time, and is more comfortable than a bandage. He applies the blister late at night, and removes it next morning. A little chloroform or C. E. should be given beforehand, and a dose or two of tinct. opium, about M xx, once or twice daily for the first few days, particularly at night. Any loose skin on the raw surfaces should be removed. A piece of lint large enough to extend an inch or more beyond the raw surfaces is then spread *thickly* with savin ointment and applied to the raw place. Small strips of lint attached to the upper border and secured in front of the neck help to prevent the lint slipping down. This is important, since, if the border of bare lint slips onto the raw surface, it is difficult to remove and causes bleeding. Each dressing is left on, approximately, 12 hours. When changing it, no attempt should be made to clean up the raw surfaces, but the skin around should be carefully cleansed with moist cotton-wool. The dressing must be lifted off gently and quickly, and another

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(1) Practitioner, May, 1917.

applied, after cleansing the skin. The application of the new dressing during the first day or two causes a good deal of smarting, and a little chloroform should be given each time. One should aim at producing a thick, creamy discharge, and the amount covering the raw surfaces should be left there; no harm results, it being sterile—on the contrary, in the author's opinion, it promotes further discharge. He smears the skin around the raw surfaces with zinc ointment, before applying a new dressing of savin.

"In some patients, the raw surface has a tendency to inflame. This should be watched for; and, if it occur, resin or zinc should be applied instead of savin for a day or two; after that, it may be necessary to apply a mixed ointment of equal parts of zinc and savin. Generally speaking, however, the raw surfaces will bear the savin dressings very well for at least 12 days, and there is no smarting on changing them after the first day or two. At the end of 12 days, as a rule, savin is stopped, and dressings of zinc ointment are applied with a view to healing."

Midelton always applies the upper blister, *i. e.*, in the region of the cervical enlargement, first. When the raw surface is healed, he waits six or seven days and then applies one, either whole or divided, in the region of the lumbar enlargement, and proceeds precisely as in the case of the upper. When this process is at an end, he usually waits three or four months, and merely treats symptoms in the interval. Then he begins again and does just as before. A third course may be gone through at the end of a further six months. The patient is usually kept in bed during the treatment. Sometimes, very little benefit is noticed after the first course; in fact, all the symptoms may be exaggerated and the patient may become very cantankerous and hard to manage. As the final results are so eminently gratifying, the author has no hesitation in bringing out his powers of persuasion to the utmost.

(b) Multiple Superficial Acu-puncture with Counter-irritants. An instrument containing 33 needles, set in a block of metal to which a long coil spring is attached, is used for this purpose. By pulling on a handle when the instrument is in position, minute punctures may be made in the skin. These are immediately painted over with a mixture containing 4 ml. of croton oil and 0.015 to 0.030 gm. of cantharides to 30 ml. of almond oil. A fine rash soon forms, which generally becomes pustular within 48 hours. These pustules form in rings owing to the arrangement of the needles, and it is convenient to prescribe so many "rings" for each patient. A strip of lint may be stretched over the mouth of the acu-puncture instrument and saturated with pure lysoform. This is non-odorous, does not rust the needles, and does not irritate the skin. The skin should be sponged with rectified spirit before an application is made. The author pulls and lets go three times before removing the instrument, thus making 99 small punctures in each "ring." In a sensitive patient, he uses a weaker preparation than the above; but never stronger, for blistering may occur, and that is not aimed at. This form of treatment, although not so powerful as the blister and savin, acts with extraordinary celerity in certain cases of neuritis, arthritis, etc., and has the advantage of requiring little after-attention. It is always well in every case to make a test treatment of a few "rings" on one leg to begin with, for some patients get a sharp general reaction after each application. The number of "rings" made at each sitting is arbitrary. When patients are well used to them, as many as 100 may be put on. They may be applied every three or more days. As a rule, a weekly interval is most convenient. It is well to allow one set of pustules to dry up before making another application.

(c) The galvano-cautery is the least powerful of the three methods, but it is quickly done and convenient, no dressing whatever being necessary. In mild cases of want of nerve tone, psychasthenia and neurasthenia, it acts like a charm if applied to the back on each side of the spinal column. A large blunt cautery point is selected, and dots or dashes made according to the fancy of the operator. Six dots or 60 may be put on each time, but the author rarely exceeds 24. One may burn deeply or superficially. The more lightly it is done the better the result.

NUTRIENTS.

The Preparation of Vegetable Foods for the Diabetic. Ruth A. Wardall[2] discusses the extraction of soluble reducing substances from vegetables. This is of importance, since the carbohydrate-free foods are limited in number. Efforts have therefore been made to remove or reduce the carbohydrate naturally occurring in some of our foods, thereby making them suitable for the diabetic diet. The "thrice-cooked vegetables" represent such an attempt. In preparing them the water is changed twice during the cooking process and thrown away, carrying along a certain amount of soluble material. To learn something of the condition of the food after this treatment, "thrice-cooked vegetables" were prepared and analyses made to determine the extent to which carbohydrate is removable by water extraction. It soon became evident that there is a variation in the effectiveness of the method depending on the vegetable used. Thus, cauliflower is not only comparatively rich in reducing substance, but is also slow to give this up by cooking, as evidenced by the number of extracts showing reduction. The common use of spinach in the diet of diabetics is easily justified by the low carbohydrate content, by the ease of its extraction, and by its good color and appearance even after several extractions. Fortunately, spinach retains its flavor to an appreciable extent. Celery also deserves a place in the diet of the diabetic. The ordinary field mushrooms (*Agaricus campestris*) are unique among the foods examined. These seem suitable for use, without modification, in the most restricted diet, and may be prepared alone or in combination with other less tasty products for the sake of flavor. The value of the mushroom is in its flavor, for it has no extractable carbohydrate, and Mendel (1898) has shown that its nitrogen does not occur as protein, but in an unavailable form. This variety of mushroom may be found in the fields in the proper season, and it is not very difficult to cultivate. Mushrooms, both fresh and dried, are fairly com-

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(2) Jour. Amer. Med. Ass'n., Dec. 1, 1917.

mon in many of our markets and are frequently obtained at a very reasonable price.

Following the principle used in the extraction of the sugar beet at 60° C. (140° F.) in the commercial preparation of sugar, vegetables were finely sliced, well covered with water at 60° C. (140° F.) and allowed to soak. At intervals of ten or fifteen minutes, the water having cooled to 45° or 40° C. (113° or 104° F.), was drained off, and fresh water at 60° C. added for the next extraction. The extraction at the lower temperature seems equally efficacious in the case of some vegetables, but it is not adapted to the preparation of cabbage, for example, and probably not to some others. The extraction at 60° C. has the advantage of impairing color and texture less than the repeated extractions with boiling water. Thus, carrots lend themselves well to this process of extraction. An attempt to extract carrots with cold water showed that only a very small amount of the reducing substance of the carrot is removed by cold water.

Cod Liver Oil a Prophylactic Against Rickets. Alfred F. Hess and Lester J. Unger[3] arrive at the conclusion that the negro infants who received cod liver oil for six months regularly are protected from rickets, whereas those who were given no protective therapy are almost certain to develop the disease, even though breast-fed. A four months' course of treatment, averaging a total of from 16 to 20 ounces of oil, was found insufficient to afford protection. Among twelve infants of this group, five were found to show progressive rickets. It would seem that six months should be considered the minimum duration of treatment. It is likewise true that no hard and fast rule can be laid down as to dosage. The plan followed was to give infants under 6 months one-half teaspoonful of oil three times a day and older infants twice this amount. It was found that almost all babies can take cod-liver oil, although it may disagree temporarily and may have to be discontinued for short intervals when there is digestive disturbance. Infants of from 2 to 3 months tolerate the oil in half-teaspoonful doses, and younger ones may

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(3) Jour. Amer. Med. Ass'n., Nov. 10, 1917.

be given still smaller amounts. The study was not carried out during the summer months, so that it does not provide a criterion of the practicability of oil therapy in the warm weather.

ALTERATIVES.

Effect of Phosphorus on Growing, Normal and Diseased Bones. D. B. Phemister[4] by means of Roentgen ray examinations has shown that phosphorus affects the normal bones of children in much the same way as described by Wegner for experimental animals. The effects on enchondral bone growth is especially well marked. No definite increase in transverse growth could be made out, but if slight it would easily escape detection by means of the Roentgen ray, especially as the technique varied with each set of plates. He also found that some time after the phosphorus is stopped there is a continued but less marked overproduction of bone in the juxta-epiphyseal region of the shaft which is probably due either to the cumulative effect of phosphorus or to the stimulating influence of the excessive stores of calcium salts in the neighboring bone. In a case of osteogenesis imperfecta, the transverse growth was as strikingly affected as the longitudinal, and a decided therapeutic effect was obtained. Judging from the general effect it produces, Phemister believes that phosphorus if given early in fractures during the active period of repair should stimulate callus formation and ossification. In non-union, however, when the natural reparative impulses have been exhausted, little could be expected from its use.

Effect of Phosphorus and of Calcium Phosphate Upon Calcium and Phosphate Metabolism in Rachitis Tarda. B. Ricklin[5] undertook to study the calcium and phosphate metabolism in a case of rachitis occurring in a boy 15 years of age, whose disease had developed in the course of two years. The experiment was continued for two months in six periods of over more than five days each. After two preliminary

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(4) Jour. Amer. Med. Ass'n., June 8, 1918.
(5) Cor.-Bl. f. Schweiz. Aerzte, Nov. 24, 1917.

periods without medication, the patient was placed upon two periods during which he received 5 ml. three times daily of a solution of phosphorus in cod liver oil, 0.01 gram per 100 ml. He was then placed upon two periods of 5 ml. three times a day of a calcium phosphate suspension, 10 gms. in 100 ml. of cod liver oil.

During the control periods the average retention of CaO was 0.22 gm. per day, or 15.2 per cent. of the ingested calcium. During the phosphorus cod liver oil periods the average daily retention was increased to 0.36 gm. CaO or 22.1 per cent. of the ingested calcium. Still better were the results during the calcium phosphate period, during which under exactly equal arrangement of the experiment a retention of 0.85 gm. per day equal to 39.9 per cent. of the ingested calcium was observed during 22 days.

Alongside of this calcium retention there is also a retention of phosphate. While during the control period the phosphate retention was only 0.30 gm. per day, or 11.25 per cent. of the ingested phosphate, it rose during the phosphorus-cod liver oil period to 0.92 gm., or 24.6 per cent. of ingested phosphate; and during the calcium phosphate-cod liver oil period, to as much as 1.99 gm. per day equivalent to 41.1 per cent. of ingested phosphate. That this calcium phosphate retention was accompanied by therapeutic results is undoubted as the patient improved not only clinically, but also showed definite improvement in bone structure on Roentgen-ray examination.

HEMATINICS.

IRON.

The Hypodermic Use of Iron. To obviate incompleteness of absorption and assimilation of iron given by mouth, the hypodermic administration of iron has become increasingly popular in recent years. For this purpose the iron is usually presented in the form of iron and ammonium citrate, since this is one of the least irritating and most soluble of the salts of iron.

Inasmuch as reports of toxic reactions following the hypodermic injection of iron are not rare, L. W. Rowe[6] undertook some experiments in which iron and ammonium citrate solution was administered hypodermically to dogs and guinea-pigs to find a possible reason for these unfavorable symptoms. The experiments reported were largely negative in their results and do not bear out the occasional unfavorable clinical reports. The author concludes that the most logical explanation of this difference between experimental and clinical observation seems to be that the anemic patient, due to his lowered vitality, is unable to assimilate large doses of soluble iron salts and that for this reason systemic disturbances result.

Local irritation produced by the hypodermic use of iron solution is frequently encountered. This difficulty will probably never be entirely overcome until a satisfactory colloidal solution of iron is prepared for hypodermic administration. Ferric ammonium citrate, when properly prepared, can usually be safely used hypodermically in a dose of 0.1 gm. (1 mil of a 10 per cent. solution). However, in severe cases of anemia a smaller dose of a less concentrated solution is apparently better suited for hypodermic administration if an undesirable systemic reaction is to be avoided.

HEMOTHERAPY.

Subcutaneous "Homohemotherapy." J. A. Sicard[7] differentiates between *heteroserotherapy,* or injection of serum from another animal species, *autoseretherapy,* the injection into the patient of his own serum, obtained by previous venepuncture, and *homoserotherapy,* the injection into a human subject of serum obtained from another human being, *e. g.,* the use of convalescents' serum. *Homohemotherapy,* on the other hand, means injection of blood from one human being into another, without resorting to the more complicating technique of transfusion, which latter however it is

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(6) Therap. Gaz., December, 1917.
(7) Presse méd., June 13, 1918.

not intended to replace. Its scope is more modest. It is particularly suitable to combat hemorrhagic and hemophilic diatheses and certain anemic states.

The author recommends the following simple technique. Using two or three needles of about 1 mm. caliber and 4 cm. length (lumbar puncture needles), one of these is inserted through the skin of a patient's abdomen, which has been previously sterilized by painting with iodine. The veins at the bend of the donor's elbow having been congested by constriction of the arm, the second needle is inserted into the most prominent of these veins, and the blood is received in a sterilized porcelain capsule, of about 30 ml. capacity, the inside of which had previously been coated with paraffin. The blood is immediately aspirated into a sterile syringe (20 ml. capacity), and rapidly injected into the patient. The syringe is then washed with sterile distilled water, and ready to serve anew. To prevent reflux of blood from the open needle, the end of a small glass syringe may be fitted to it. By repeating these maneuvers, one may inject, at one sitting, 80 to 120 ml. of blood. If the blood does not flow rapidly enough from the donor's vein, a second vein nearby may be punctured in addition. It is well to have two or three syringes at hand, in case one or the other of them does not work well. The hematoma formed is gradually absorbed in the course of three to five weeks. The whole abdominal subcutaneous tissue, and even that of the thigh become discolored with ecchymotic spots during most of this time.

The author has practiced this procedure in quite a number of cases, practically without pain, and without any infection or other disagreeable consequences. In certain cases he has repeated the injections for four days in succession.

The therapeutic effects have been most gratifying in three cases of infectious toxemia with purpura and internal hemorrhages, which resisted injections of horse serum, also in two cases of hemophilia. Finally, good results were obtained in several patients suffering from cryptogenetic chloro-anemia as well as in extreme secondary anemia after hemorrhages from hemorrhoids or uterine fibroids.

This procedure recommends itself by the simplicity of its technique, the ease with which asepsis is secured, a greater therapeutic efficacy than when serum alone is injected, and the avoidance of anaphylactic reactions that may occur when horse serum is used.

In cases of bleeders, very striking results have been obtained by means of this method by Rufus Southworth,[8] who describes the technique he employed as follows: "Under most rigid asepsis a large hypodermic needle is introduced into the median basilic vein of a person who is not a blood relative of the patient, and with a 20 ml. glass syringe that amount of blood is withdrawn and injected subcutaneously into the thigh of the patient. The process is repeated so that a total of 40 ml. is injected. The hematoma so formed is quickly absorbed without local disturbance and the escaping blood from the patient which has hitherto refused to coagulate soon begins to clot."

RESTORATIVE ORGANTHERAPY.

Under this heading will be discussed those uses of organ extracts that are not more appropriately taken up under "Functional Therapy."

Endocrinology in General Practice. Henry R. Harrower[9] points out that the chief reason why this particular phase of medicine is still labeled "new" or as some persist in calling it "advanced," is because they are behind. The impression that endocrinology is a science concerned with the study of rare and peculiar symptoms-complexes due to ductless glandular disease is quite incorrect, for these diseases are properly among the least important of the endocrine disorders simply because, comparatively speaking, they are the least frequent. The really important and practical relation of endocrinology to general practice lies in the insignificant and overlooked disorders resulting from minor or hidden disorders of endocrine function. These are, the author

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(8) Ohio State Med. Jour., December, 1917.
(9) Med. and Surg., January, 1918.

believes, "as common as the exanthemata." One finds signs of them on every hand.

Still more enthusiastic even is W. V. P. Garretson,[10] who says: "By the use of organotherapy, one's armamentarium, therapeutically, is vastly augmented. Conditions heretofore considered hopeless frequently clear up under proper treatment with internal secretions as if by miracle, astounding and gratifying to both patient and doctor. I consider that the physician who practices medicine today without the wise and discriminating use of organic extracts is as greatly handicapped as a surgeon would be in attempting to perform a laparotomy without a scalpel. The frequent unsatisfactory results experienced by many are due to the fact that few have as yet learned how to interpret glandular dysfunction, and fewer still have learned dosage. Far too large are the doses generally prescribed, and often the patient thus suffers from aggravated symptoms." "When one remembers that analyses reveal that physiologically only very small amounts of these substances are normally existent in the blood (as example, adrenalin 1 to 2,500,000) one may realize that giving five, ten, or fifteen grain dose three times a day of any of these organ extracts is outrageous therapy. There are certain types where deficiency of secretion (*e.g.*, myxedema and subthyroidal states) require doses of moderate size, but such doses in maximum should not exceed one or two grains daily, to obtain most satisfactory results. In the states of dysfunction, when one has but to *tickle* the gland, as it were, by stimulation through its own active principle, most glowing results are obtainable by very small doses. There was a time when I scoffed and ridiculed such a method of therapy, feeling that results obtained, such as I witnessed, were the reactions of suggestion upon the patient as well as myself, but now, after over two years of observation, carried on in both clinical and private practise, I am compelled to admit that doses even so low as one millionth grain, administered in the dilutions of potency, effect reactions which are so evident that I am forced to accept the dosage principles of Hahnemann as applied to organotherapy.—[!ED.]"

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(10) New York Med. Jour., May 11, 1918.

Wm. Engelbach and John L. Tierney,[1] on the other hand, call attention to the fact that calm stability is required by every student of this fascinating field, lest early in his endeavors he accepts theory for fact, entirely loses his perspective, and be carried away by the mirages of its illusive pictures.

[Hence much that, though plausible, is fanciful rather than scientific has been omitted from discussion here.—Ed.]

Thyroid.

Thyroxin, the Active Constituent of the Thyroid. E. C. Kendall[2] has, at last, succeeded in isolating the active principle of the thyroid gland after eight years of practically continuous investigation and after more than two tons of thyroid glands had been used. Not only has he separated this substance; but he has also determined its chemical formula both empirical and structural, together with its synthesis, and investigated its physiologic action as well as its use in the treatment of clinical conditions. Its structural formula is shown in Fig. 1.

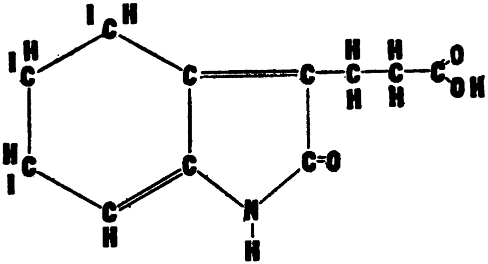

Fig. 1.—The structural formula of the active constituent of the thyroid.

This substance increases the emergency output of the animal organism. A dose of 0.33 mg. increases the basal metabolic rate of an individual weighing approximately 150 pounds by 1 per cent. If the basal metabolic rate of an individual of this weight is 30 per cent. below

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(1) Med. and Surg., January, 1918.
(2) Jour. Amer. Med. Ass'n., Sept. 14, 1918.

normal, the administration of 10 mg., will raise the metabolic rate to the normal; and if it is 21 per cent. below normal, the administration of 7 mg. will raise it to normal.

The moment the metabolic rate increases, the pulse rate, the pulse pressure, and the rate of blood flow increases; and, if pushed long enough, the body sugar, fat and proteins will be used up in greater amount than normal, meaning an increase in the carbon dioxide output and oxygen consumption and an increase in nitrogen elimination. Symptoms due to subnormal activity of tissues will be relieved; in other words, the condition of myxedema will disappear. If the metabolic rate is carried high enough, so high that it approaches that found in hyperthyroidism, then the symptoms of hyperthyroidism will appear.

Contrary to expectation, the iodine is not the most active portion of the molecule, the physiologic activity of the substance, is produced by the CO-NH groups, which has been demonstrated by the fact that when the hydrogen on the imino has been replaced with acetyl, the substance loses its physiologic activity. Investigation of the acetyl compound showed that in alkaline solution the indol form no longer exists, but that there is hydrolysis of the CO and NH groups, resulting in the opening of the ring and the formation of COOH and NH_2 (Fig. 2). Thyroxin exists within the body, not in the closed ring form, such as is present in indol, but in the form of COOH NH_2. The ability of the indol ring

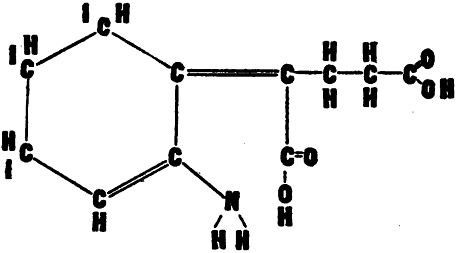

Fig. 2.—The open ring form of thyroxin as it exists in the body.

to open in this manner furnishes the first concrete conception of how the substance behaves chemically within the body. The reason for the inactivity of the acetyl is interference with the chemical reactions associated with the NH_2 group of thyroxin. The same relation exists between creatin and creatinin, and the same relation exists between amino-acids and the form in which amino-acids are united in protein.

Patients with complete atrophy of the thyroid have basal metabolic rates approximately 40 per cent. below normal. This makes it probable that other chemical substances in the body possessing the same grouping that occurs in thyroxin, such as amino-acids and proteins, creatin and creatinin, are capable of carrying on a reaction within the body, which is merely increased in rate by thyroxin. Administration of thyroxin alone can bring back and maintain the normal metabolic rate in these persons. It seems not improbable that the presence of iodine merely renders the active groups more reactive. This substance acts as a true catalyst, being used over and over, hour after hour, without destruction except at a very slow rate.

HYPOPHYSIS.

Hypophysis Treatment of Polyuria in Diabetes Insipidus. Jacob Rosenbloom[3] reports a typical case of hypopituitarism with diabetes insipidus. The patient is a boy, aged 12 1/2 years, who had urinated excessively since he was 3 1/2 years of age. In the last year his eyesight was getting bad. Physical examination was negative with the exception of the presence of a bilateral temporal hemianopsia. A roentgenogram of the brain showed a normal sella turcica. The diagnosis of diabetes insipidus with a possible suprasellar cyst of the pituitary was made. In this case, 1 ml. of pituitary solution injected subcutaneously, reduced the quantity of urine eliminated to one-half or less. The effect of the injection of the pituitary solution lasts only about twenty-four hours. Thyroid extract did not have any effect upon the polyuria.

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(3) Jour. Amer. Med. Ass'n., May 4, 1918.

CORPUS LUTEUM.

Corpus Luteum. Walter T. Dannreuther[4] used, in a series of fifty cases, the soluble aqueous extract of corpus luteum supplied in ampoules, suitable for intramuscular injection. The contents of each ampoule, 1 ml., are equivalent to 0.18 gm. of the desiccated extract, or 1.18 gm. of the moist glandular substance. This would probably be equivalent to 0.30 gm. by mouth. When this agent is administered by injection several striking differences will be recognized, as compared with oral administration: 1. vertigo and nausea, so often mentioned by patients ingesting the desiccated extract before establishment of toleration, are seldom noted. 2. Overdosing with the soluble extract is usually manifested by headache. 3. The desired results are more rapidly attained than after the oral use of the ordinary extract. 4. After the influence of the aqueous extract has become apparent, the desiccated extract will maintain the improvement. Corpus luteum extract has been found of service in the following conditions:

1. Functional Amenorrhea in young woman in spite of negative pelvic findings, due to insufficient ovarian activity, as a rule immediately improves under corpus luteum therapy. They also look better, feel stronger, become less nervous, and lose weight gradually, and a fairly regular menstrual flow is soon established. Treatment in such cases generally consisted of intramuscular injections approximately five days apart, with negative galvanism immediately before each expected period. As it becomes evident that normal menstrual periods are becoming well established, the intervals between the doses are gradually lengthened from five to seven days, and later to ten days.

2. Vicarious Menstruation. Two patients in whom a monthly periodical epistaxis replaced the regular uterine bleeding responded to corpus luteum extract.

3. In hyperemesis of Pregnancy hypodermic injections of corpus luteum were first employed by Hirst[5] (1916). Dannreuther's experience coincides with that

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(4) New York Med. Jour., Oct. 20, 1917.

(5) Abstracted in Vol. VIII. Practical Medicine Series, 1917, p. 132.

of Hirst. The success of this therapeutic measure for the alleviation of hyperemesis of pregnancy has been marked in eight of his cases. Daily intramuscular injections of the aqueous extract of corpus luteum were used until relief was obtained.

4. In post-operative ovarian insufficiency, often evidenced by a delay or a decrease in the quantity of menstrual bleeding, frequently accompanied by clots and vague pelvic discomfort, the aqueous extract of corpus luteum has been uniformly satisfactory. Normal menstruation has been reestablished in patients to whom the ordinary extract had been given in vain. In a case reported, the author used five doses on alternate days when the patient menstruated on the proper date for the first time since the operation. Since then her flow has been absolutely regular. The intervals between the doses were gradually lengthened, so that two doses a month were enough to maintain her regularity.

5. In induced menopause, due to total extirpation of all ovarian tissue, if the treatment is begun promptly, corpus luteum extract will forestall all the unpleasant after symptoms usually precipitated by these operations. The results from the exhibition of the desiccated extract have been so universally satisfactory that even the aqueous extract can prove of but slightly greater advantage. Its sole point of superiority is its greater rapidity of action.

6. In physiologic menopause, the efficiency of the soluble aqueous extract is probably even more striking than in any of the others. Essentially the same results can be achieved eventually with the desiccated extract, but a much longer time is required. With the aqueous extract improvement is almost immediate, and after five or six injections given on alternate days, all the physchoneuroses and vasomotor symptoms disappear entirely. Corpus luteum produces a comparatively rapid fall in blood-pressure which is a desirable consequence in these patients and may be permitted with safety, particularly when the systolic pressure is considerably above normal at the beginning of treatment, providing no untoward byeffects arise.

"The technique of administration is simple. An all glass syringe of the Luer type is best adapted for making the injections, and should always be sterilized by boiling with needle. To avoid local reactions and insure prompt and complete absorption, the injections are made intramuscularly rather than hypodermically. The most convenient site is the belly of the deltoid muscle, although other regions may be utilized if preferred. If the material is deposited deeply and surrounding area gently massaged for a few seconds, pain and subsequent tenderness seldom follow. No severe local reactions, general reactions, abscesses, nor anaphylaxis have occurred in any instance.''

''Control of dosage is exercised rather by shortening or prolonging the intervals between the doses than by varying the quantity given at any one time. No fixed rule can be advanced, and one's judgment must be governed to a large extent by clinical experience and careful observation. In general, it may be said that patients with pernicious vomiting of pregnancy tolerate most frequently repeated doses. Here it may be given daily without apprehension, unless some manifestation of overdosage occurs. For almost all the other conditions wherein it is indicated one dose every other day usually suffices; and the intervals may be lengthened gradually as the symptoms are controlled or the blood-pressure decreases.''

In nearly all cases it is wise to prevent a too sudden fall of the systolic pressure, especially in those whose pressure is subnormal in the beginning. Readings should be taken, not occasionally, but at frequent intervals, preferably daily. The author believes there will be found many cases in which the simultaneous administration of thyroid or some other organic extract will enhance the action of the corpus luteum by aiding in the restoration to normal of the general endocrine equilibrium.

FLUID RESTORATIVES.

The Preparation and Some of the Uses of Fischer's Solution. Rufus Southworth[6] finds that for the prep-

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(6) Ohio Med. Jour., December, 1917.

aration of Fischer's solution, the saline ingredients are best put up in colored bottles with paraffined corks. Each contains a mixture of 10 gm. of crystallized C. P. sodium carbonate and 14 gm. of C. P. sodium chloride. This amount dissolved in 500 ml. of water makes the proper solution. The hydrated, or crystallized sodium carbonate, only should be employed, and not the dehydrated salt. That is why it is so important that the mixture be kept in an air-tight bottle. This solution may be given by the "Murphy drip," 2 hours on and 2 hours off. To prepare the solution for intravenous use, it is best to obtain from the drug houses tubes, hermetically sealed, containing the saline ingredients chemically pure and dissolved in from 1 to 2 oz. of distilled water, which when added to sterile water enough for one pint makes the proper solution. Fischer's solution must not be used subcutaneously as a slough will result. The author has obtained with the use of this solution excellent results in several cases of persistent vomiting of pregnacy, especially when he added to each pint of Fischer's solution, 1.3 gm. of sodium bromide. This was given by the drop method per rectum, at the rate of 60 drops per minute, or about 500 ml. in two hours.

Acacia Solution (7 per cent.) Best Substitute for Blood After Hemorrhage. This is the finding of Peyton Rous and George W. Wilson[7] who performed careful experiments, to determine in the first place, the degree to which the healthy body will withstand losses of red cells only—or, more properly speaking, of functioning hemoglobin—animals were bled repeatedly, and the blood bulk at once restored by the injection of compatible plasma. The results were surprising. It was only when four-fifths or slightly more of the hemoglobin was removed that the animals lay panting or sat somnolent for a long time, unless touched, and died in from three to six hours. Such great losses of hemoglobin as were accomplished in these rabbits are never brought about by hemorrhage. As is well known, a loss of slightly more than half the total blood bulk is usually fatal to man. This fact is true also of rabbits. Hence the amount of the pigment retained in the body under the

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(7) Jour. Amer. Med. Ass'n., Jan. 26, 1918.

circumstances of the most severe acute hemorrhage is always far above that which, as experiments have shown, will support life. Therefore, however desirable it may be, it is not essential to supply blood corpuscles in ordinary cases of acute hemorrhage. Even in the worst example, the body retains at least twice the minimum functioning hemoglobin which, if other factors are favorable, will support life. As has been shown by Abel and his co-workers (1914), the degree to which plasma may be substituted is practically unlimited, provided the total blood bulk is maintained. The ability of plasma to replace whole blood is shown by the fact that, when more than half the total calculated blood volume has been taken, and the carotid pressure had fallen to a physiologic zero, it was instantly and permanently restored to the normal by the injection of an equivalent quantity of plasma. A saline solution, on the other hand (Ringer's fluid), brings about only a slight, transient recovery of the pressure. The reasons for the failure of saline solution, is that it leaves the vessels for the tissues and the urine almost as soon as it is injected.

The authors, therefore, investigated the relative merits of various plasma substitutes. Gelatin-containing fluids improve in their ability to maintain blood-pressure as the percentage of gelatin is increased, 4 per cent. is better than 2.5 per cent. (Hogan's solution, 1915); and larger concentrations of gelatin up to 6 per cent. act proportionately still better than Hogan's solution.

Hypertonic glucose and dextrin solutions have been found to exert only a slight transient effect in raising blood-pressure in the bled rabbits. Bayliss (1917), who originally advised either 6 per cent. gelatin or 7 per cent. gum acacia as blood substitutes, has recently advocated the latter; and for good reasons. It can be sterilized by boiling, whereas the autoclaving of gelatin is necessary in order to kill tetanus spores. It is more uniform in constitution than commercial gelatin; and, being protein free, it does not induce anaphylaxis or the severe reactions that often follow the latter. The authors confirm Bayliss' statement that 7 per cent. gum acacia will permanently restore blood-pressure to normal. A 2 per cent. acacia solution will, like Hogan's solution, at first raise the pressure to normal, but it drops off within a few minutes to the danger point. Four per cent. is more satisfactory, as the secondary drop in pressure, being slow, is better compensated. But neither the 4 per cent. nor the 5 per cent. solution recommended by Hurwitz (1917) is effective in all cases. A 6 or 7 per cent. solution is required, if one is to bring back the normal pressure in an organism depleted of its fluid reserves. Horse serum would be an effective blood substitute, except for the risk of inducing sensitization or causing anaphylactic shock. Horse serum injections, under the conditions of the battlefield, might well save many lives, but they would probably cause death in some cases.

The authors conclude that, when a fluid must be furnished which will take the place, over many hours, of the lost blood bulk, then except for the blood or plasma of other human beings, fluids containing from 6 to 7 per cent. of gum acacia are the best at present available for the purpose.

The danger limit of acacia solution injections seems to lie in its tendency to the production of pulmonary edema, which it is much more liable to induce than is salt solution, as has been noted by H. Roger,[8] who found that, while the introduction of from 600 to even 800 ml. of normal salt solution in rabbits does not produce any pulmonary infiltration, the injection of 200 ml. of this fluid rendered viscid by the addition of acacia, suffices to produce pulmonary edema.

The results of Rous and Wilson with chloride infusion have been found by A. H. Smith[9] to hold true as far as other saline ions are concerned, such as bromide, nitrate, thiosulphate. The only ion that caused the blood volume to remain higher for a longer time was sulphate. The author doubts, however, that it would prove much more efficient than Ringer's solution.

PRODUCTION OF LEUKOCYTOSIS.

Leukocytosis Produced by Hypertonic Salt-Solution and Leukocytic Extract. R. A. Archibald and Ger-

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(8) Presse méd., Nov. 22, 1917.
(9) Science, July 5, 1918.

trude Moore[1] found, both by experiment upon rabbits and by observations on cases of sepsis that the value of leukocytic extract (2 ml. administered hypodermically) is exalted many times by magnesium sulphate (400 ml. of 2 per cent. solution intravenously), which in itself has apparently no effect. If both are given intravenously, one-half hour at least must be allowed to elapse between the administration of each.

"Leukocytic extract given intravenously gives its maximum white blood count in four hours after injection, while the subcutaneous injection shows the maximum increase from the eighth to the tenth hour. It was also demonstrated that the leukocytic increase following intravenous injection is more transient than when administered subcutaneously." "It is apparent that the joint action of the leukocytic extract and magnesium sulphate solution is intensified when administered in a bacteremic condition." The authors believe that in the treatment of bacteremias the combined use of leukocytic extract and magnesium sulphate solution has proven to be more efficacious than any other treatment heretofore devised.

Hypertonic Glucose Solution Intravenously. Lawrence Litchfield[2] calls attention to the fact that, in combating serious diseases, besides the specific effects of the invading microörganisms, we have to deal with three very important conditions, dehydration, intoxication (from retention of waste products) and nitrogen starvation. This combination presents the following picture: respiration rapid; the pulse rapid small and thready, tongue dry, skin generally dry, features pinched, eyeballs sunken, surface of the body cold, extremities clammy and shriveled. Apathy develops, there is oliguria and constipation, sometimes there is restlessness and irritability, followed by hallucinations, delirium and coma. These symptoms may appear in the course of many diseases such as empyema, meningitis, typhoid fever, Shiga dysentery, peritonitis, brain abscess, pneumonia, etc. To supply a sufficient amount of fluid for the daily deeds and to make up the extreme deficiency

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(1) Calif. State Jour. of Med., September, 1917.
(2) Jour. Amer. Med. Ass'n., Aug. 17, 1918.

of the past days, a suitable amount of hypertonic glucose solution injected intravenously has striking and much better effects than have control injections of salt solution. Glucose is non-toxic, quickly utilized by the organism, the best sparer of nitrogen, is a stimulant to the mechanism of cell metabolism, and it is easily obtained and easily prepared. The results of a single small injection are particularly striking in cases in which the injection has been followed by a marked reaction—chill, rise of temperature, sweating, etc. However, the author feels that a reaction following the intravenous injection of glucose is an artefact to be avoided.

[With this the authors of the article, abstracted below, would not agree.—ED.]

Technique: For clinical work, 250 ml. of a 25 per cent. solution whose caloric value is 1 calory per cubic centimeter, may be given in about one hour to the average adult patient. Any method for arsphenamin administration is satisfactory for glucose solutions. The water should be pure, filtered, and double distilled. The solution should be sterilized by autoclave or boiling. The temperature of the solution should be maintained during the administration at about 100° F. This may be done conveniently by having the tube pass through a large basin of hot water placed beside the patient. The needle is held in position by a piece of adhesive plaster fixing the tube to the arm about an inch from the needle. Small needles are best. A hypodermic injection of morphine may be given, if necessary, to control a delirious or hypersensitive patient. The largest amount the author has given at one time was 1,700 ml., which flowed with an intermission of two hours, continuously for eleven hours, and was not followed by glycosuria. The procedure may be repeated, if indicated, at intervals of eight, twelve, eighteen or twenty-four hours, until, with the aid of the oral and rectal administration of water, the normal proportion of fluids has been restored and convalescence established. The author reports 13 cases of infectious disease in most desperate condition in which intravenous injection of glucose solution led to immediate improvement.

[In the light of the below recorded observation, it is to be regretted that Litchfield does not give us data on the influence of these injections upon the leukocyte count.—ED.]

Intravenous Injection of Isotonic Sugar Solutions in Septicemia. G. Audain and F. Masmonteil[3] report favorable results from large intravenous injections of sugar solution in the treatment of septicemia, erysipelas, and rheumatism. A sufficient amount of isotonic sugar solution is used to excite a pronounced chill within an hour after the injection, followed by a transitory rise in temperature and a sweat. Within half an hour, the leucocyte count in the blood rises, reaching its maximum at the apex of the temperature curve, the polymorphonuclear cells predominating, and then declines though to a higher level than before the injection. In addition to this stimulation of the defensive processes of the system, the authors point out the importance of the nutritive value of the daily intake of sugar, amounting to 100 gm. of sugar, in these anorexic patients, as well as the advantage to be derived from the diuresis produced by these injections.

Isotonic sugar solutions, are obtained by using the following proportions:

For glucose	47.6 in 1000
For saccharose	103.5 in 1000
For lactose	108.9 in 1000

At first from 300 to 500 ml. of such solution are injected; but later, and in grave cases even from the very first, 1,000 or even 2,000 ml. a day may be given in 2 or 3 fractional doses. Enough should be used to keep the leucocyte count at about 25,000. The treatment should not be entirely discontinued until four or five days after defervescence.

Sodium Succinate Leukocytosis. Frederick S. Hammett, Ernest E. Kessler and C. C. Browning[1] found that the subcutaneous administration of sodium suc-

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(3) Presse méd., Nov. 8, 1917.
(1) Jour. Amer. Med. Ass'n., July 7, 1917.

cinate in doses of 0.1 ml. of a 1 per cent. solution causes an increase in the leukocyte content of the blood of both normal persons and in tuberculous patients. This increase in the number of leukocytes was noted four to six hours after the injection; and, in some cases, seemed to persist for several days.

[Longer, it seems, than might reasonably be expected. —Ed.]

Use of Bakers' Yeast in Diseases of the Skin and of the Gastro-Intestinal Tract. Philip B. Hawk, Frank Crozer Knowles, Martin E. Rehfuss, and James A. Clarke,[2] studied the effect of Fleischmann's Compressed Yeast on a variety of conditions of disease. The fresh yeast was used in all cases, a new supply being secured from two to three times a week and kept in the refrigerator until used. The usual dose was one cake three times daily before meals or between meals. It was given suspended in water, beef tea or orange juice. The most obvious effect obtained in nearly all cases was a laxative action which in some patients made it necessary to reduce the dose to one-half or even one-quarter of a cake. They found this action useful in constipation, of which condition they report nine out of ten cases cured or improved. Tests demonstrated conclusively that yeast is not readily destroyed in the human stomach, but that, on the contrary, especially when taken between meals, a large part of the yeast passes into the intestine in the living condition. Another effect produced by yeast is the development of leukocytosis; and it is probably for this reason that it displays a curative action in furunculosis and the acnes (vulgaris and rosacea). Of seventeen cases of furunculosis, all but one of the patients were improved or cured. Of seventeen cases of acne vulgaris, all patients were improved or cured. Of eight cases of acne rosacea, all patients were improved or cured.

It is apparent to the authors that yeast has its greatest usefulness in gastro-intestinal disturbances accompanied by cutaneous manifestations.

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(2) Jour. Amer. Med. Ass'n., Oct. 13, 1917.

ACTIVE IMMUNIZATION.

SENSITIZED VACCINES.

The Preparation of Autogenous Sensitized Vaccines. L. Bazy and L. Cuvillier[3] report ideal immunization in many infections, but most especially in the treatment of obstinate furunculosis, from a sensitized vaccine prepared by means of the polyvalent serum of Leclainche and Vallée, which is the serum of horses immunized against an enormous variety of the common organisms that the surgeon has to deal with. The method of preparation is as follows:

An emulsion in physiologic salt solution of a 48-hour culture of the microörganisms, obtained from the patient, is superimposed upon a layer of the above mentioned serum of Leclainche and Vallée. Owing to difference in density, the two layers do note unite; the serum remains below, the microbes above. After short incubation, at 37° C., the microbes become agglutinated and fall to the bottom of tube, where they form a viscid mass. The liquid is then decanted, and the microbial sediment is carefully centrifuged several times in physiologic salt solution, in order to wash away all other materials. The sensitized microörganisms are then suspended in a sufficient amount of salt solution to give the mixture the appearance of a twenty-four hour typhoid culture. The authors have found that this corresponds to about 60 to 80 millions of microörganisms per mil.

So truly polyvalent is this serum of Leclainche and Vallée that the authors have not, as yet, found any organisms that the serum was unable to agglutinate, precipitate, and sensitize. Should there, however, be such organisms, they would remain in the superimposed layer, hence there would be no liability of injecting nonsensitized microörganisms.

The sensitized microbes are then heated to 56° C., three times during one hour. The vaccine, thus prepared, is injected subcutaneously in doses of 1 mil. After 5 days, another injection of 2 ml. is given; and

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(3) Presse méd., April 25, 1918.

such injections are repeated, according to the case, 3, 4 or even 5 times.

There are no ill-effects from the vaccine, except slight pain and transient swelling at the point of injection.

The authors believe that there is an almost unlimited field for the use of these sensitized vaccines. Their application might be called sero-vaccination: for it confers passive immunity, on the one hand, like a serum; and active immunity, on the other, like a vaccine. What is more logical, they ask, then to use—since it is possible to do so—the pure antibodies separated from all other materials, which are not only useless but positively harmful by production of anaphylaxis. In sensitized vaccine, the microbial bodies serve as the carriers for the antibodies.

The Use of Sensitized Vaccines is discussed by Russell L. Cecil.[4] A sensitized vaccine is a suspension of bacteria which has been previously treated with an homologous serum. The advantages claimed for sensitized vaccines, are that they are considerably less toxic than the non-sensitized bacilli, that injections of sensitized bacilli are followed by an almost immediate increase in immunity, in contrast to the non-sensitized bacteria which excite first a so-called "negative phase." The explanation offered for these differences is that by means of sensitization the bacilli and their immune bodies (amboceptors) are combined so that, when injected into an animal, they are ready for immediate attack and destruction by the complement; whereas with the injection of non-sensitized bacteria the tissue cells must first elaborate the various antibodies before the bacteria can be sensitized (*in vivo*) and broken up. Similarly one can account for the lesser toxicity of sensitized vaccine on the ground that sensitization renders the bacteria more susceptible to complement, and, accordingly, more capable of rapid disintegration into harmless products.

Even living virulent organisms when properly sensitized can be injected subcutaneously without serious consequences. Hence, the question, whether one should use a sensitized vaccine in the living form, is an

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(4) Amer. Jour. Med. Sci., June, 1918.

important one. In the author's experience with the *Streptococcus viridans,* pneumococcus and gonococcus the living sensitized virus is harmless when injected subcutaneously. With the *Staphylococcus aureus* he would be rather afraid of furuncles. With the typhoid bacillus one should not forget the recent work of Nichols, who has shown that living sensitized vaccine produces a typhoid cholecystitis when injected directly into the gall-bladder of rabbits and is therefore infectious. Cecil considers it doubtful that we are justified in using living, though sensitized, vaccines, in view of the great danger and their doubtful superiority. The author gives his impressions from the use of such vaccines, as follows: The local reaction produced by the sensitized typhoid vaccine is always mild, less severe, Cecil thinks, than that which usually follows an injection of ordinary typhoid vaccine. The constitutional reaction is generally negligible. While the superiority of sensitized over non-sensitized typhoid vaccine in immunization against typhoid fever can be established only by an extensive use of the former and a comparison of the results with those which have been obtained by non-sensitized vaccine, the lesser toxicity of the sensitized vaccine and its possibly superior immunizing power are sufficient reasons for giving it a thorough trial.

In gonococcus infections treated with sensitized vaccine, some benefit has been derived in most instances, but the results were no better than those obtained with ordinary vaccine.

Sensitized streptococcus vaccines were found of no value whatever in the treatment of infectious endocarditis.

In cases of *Staphylococcus aureus* infection, where the patient is extremely sensitive to the organism, a sensitized vaccine may be effective where the ordinary vaccine has failed. While most patients can take staphylococcus aureus vaccine without any unpleasant results, there are cases in which very small doses of staphylococcus aureus vaccine produce constitutional symptoms and a fresh outbreak of pustules or furuncles. In such cases the sensitized vaccine is indicated.

Sensitized tubercle bacillus emulsion appears to have no advantage over the ordinary bacillary emulsion so far as therapeutic effect is concerned, but the local reaction is somewhat less severe.

Cecil summarizes as follows: In the various infections treated with sensitized vaccines the results were, as a rule, no better than would have been expected with ordinary vaccine. It happened that in a few instances recovery followed the administration of sensitized vaccine after a treatment with ordinary vaccine had failed. This may have been due to the fact that larger doses could be employed without untoward symptoms.

The chief objection to the general use of sensitized vaccines, Cecil considers to be the increased labor and time necessary for their preparation. Hence, at the present time, it seems desirable to limit their use to the treatment of infections in which there is hypersensitiveness to ordinary vaccines or in which the latter have proved inefficacious.

MIXED VACCINE.

Autogenous "Mixed" Vaccine from Sputum in the Treatment of Infection Outside of the Respiratory Tract. As a result of experience with three cases which are quoted in the original note, Helen S. Leyton[5] suggests, that a lowered resistance to organisms, living in the respiratory passages, may not only be the cause of appendicitis, duodenal and gastric ulcer, salpingitis, nephritis, etc., but also that a routine examination of throat and sputa, and the treatment of chronic inflammations of the respiratory tract by vaccines may in a large measure prevent the occurrence of the above-mentioned diseases. Nowadays, sputa are regularly examined for the tubercle bacillus. If that is not present, cough mixtures are the standard method of treatment. It is exceedingly rare in hospital or ordinary general practice that a vaccine is asked for in cases of chronic bronchitis or pharyngitis. Yet in both types of case the patient is continually swallowing bacteria and their products, thus running the risk of absorbing toxins as well as of infecting the various susceptible parts of the alimentary tract.

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(5) Practitioner, May, 1918.

What more probable than that in time, possibly after injudicious feeding and during a temporary absence of hydrochloric acid in the stomach, some of these bacteria should escape destruction and set up gastric ulceration and inflammation or, passing uninjured into the intestine, cause duodenal ulceration, biliary catarrh, or appendicitis.'' The cases reported seem to bear out the author's contention.

COLON VACCINE.

Mixed Colon Stock Vaccine of Little Value in Prostatic Cases. H. C. Bumpus[6] gave all the patients vaccine for five months and then compared the results with those obtained in the previous five months without vaccine. The vaccine was administered twice a week in doses beginning with 50 million, increasing by multiples of 50 to a maximum of 500 million and continuing throughout convalescence. The administration was subcutaneous, and, with two exceptions, no untoward symptoms resulted. Following the technique of Cabot and Crabtree, the author used a mixed colon vaccine prepared from various strains of colon bacillus isolated from different urines and prepared fresh once a week.

His conclusions are that immunity to pyelonephritis by means of mixed colon bacillus vaccine cannot be produced. Nevertheless pre-operative attacks of pyelonephritis are the natural means of producing an immunity to renal infection, and their occurrence makes operative risks less. The length of convalescence is usually in inverse proportion to the length of preoperative treatment.

Autogenous Colon Vaccine in Diagnosis and Treatment of Chronic Intestinal Toxemia. G. Reese Satterlee[7] reports remarkable results from the use of B. Coli vaccine. He points out that, under normal conditions, *B. coli* lives a saprophytic existence and is not only harmless but beneficial to the host. When the colon is diseased, however, the colon bacillus is distinctly harmful. It is then capable of becoming pyogenic and its

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(6) Jour. Amer. Med. Ass'n., Jan. 26, 1918.
(7) New York Med. Jour., May 25, 1918.

intracellular poison is set free and can then act on the body of the host.

The diagnosis of chronic intestinal toxemia is based upon four chief factors: The history, the *x*-ray, the symptomatology and physical signs. The history of these patients begins frequently with an attack of acute indigestion, and often a so-called ptomaine poisoning following the ingestion of some easily decomposed or indigestible article of food. This is followed by a prolonged interference with the digestive system and by nervous disturbances, the latter frequently predominating and sometimes becoming severe enough to amount to insanity. It is essential to make a thorough study of every case, which includes a radiographic gastrointestinal investigation. In numerous instances "absolutely regular bowels" are proved to have large residues. The laxative habit does not cure, but rather aggravates the toxemia. "Residual cecums and sigmoids," etc., are found in patients who have regulated bowels by taking cathartics or laxatives regularly.

Stock colon vaccine is of little value on account of the large number of types of the colon bacillus. The organisms should be obtained from the cecal contents following a full dose of castor oil. The method of isolation of the colon bacillus and preparation of the vaccine follows the ordinary bacteriologic routine for this particular organism.

"The initial dose is from ten to twenty-five million of the dead bacteria subcutaneously, depending on the amount of toxemia in the individual. This dose is repeated at intervals of every four to seven days. The dosage is generally increased by twenty-five million each time until the maximum of 200 or 300 million bacteria is reached. Relief of symptoms is not usually obtained until three doses have been given. Occasionally quick response is seen; and, in most uncomplicated cases, three months of treatment give permanent relief. In those patients who have a relapse, quick response to vaccine injections is usually seen. In very obstinate cases it may be necessary to continue the vaccine treatment for a year or more."

A reaction after the injection of the vaccine usually occurs. This consists of local redness, the size of a fifty cent piece, pain and swelling at the site. In a severe reaction this swelling spreads until the whole upper arm is involved. This local reaction begins in six to eight hours and lasts twenty-four to seventy-two hours. At the same time a general reaction takes place. This may be briefly described as an exaggeration of all the symptoms; headache, malaise, vertigo, and occasionally nausea, a decided increase in the severity of neuralgic or myalgic pains, and of pain, soreness or discomfort in the abdomen, if these symptoms had been present. This reaction is followed by decided relief of all the previous toxic symptoms. In no case of profound intestinal toxemia has there, as yet, been a complete absence of reaction following the administration of the vaccine. The converse also holds good, that in no case in which a sharp local and general reaction has taken place could he exclude chronic intestinal toxemia. Hence this reaction is of diagnostic value.

TUBERCULIN.

Tuberculin, Its Nature and Action. Robert C. Paterson[8] believes that the various tuberculins are all very similar in their action and that the choice of which one to use is largely a matter of personal opinion. It is probable that the active agent of all of them is the dissolved protein, derived from the bacillary bodies. Tuberculin is not a true or primary toxin or poison, *i. e.*, a substance, which when introduced into a normal animal in a certain amount, usually minute, is capable of causing harm or even death to the organism. As examples of such toxins, ricin and abrin from the vegetable kingdom, the snake venoms from the animal kingdom, and the toxins of the diphtheria and tetanus bacilli might be mentioned. Unlike these toxins, tuberculin is perfectly harmless to a normal animal, even when given in enormous doses. Hamburger (1908), gave forty-three children of from 0 to fourteen years of age, all of whom had shown a negative skin test, 10, 50 and 100 mg. of old tuberculin subcutaneously without any general

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(8) Canad. Med. Ass'n. Jour., May, 1918.

symptoms resulting. One girl of six years was given 500 mg. without the slightest general effect. In contradistinction to this inertness in the non-tuberculous, the results of an inoculation of tuberculin, even in minute quantities, are totally different if given to an individual that harbors tubercles in its body. If an anatomic tubercle exists anywhere in the body, all the tissues are altered in some way, so that the response to a fresh infection with tubercle bacilli differs from that of a normal animal. In like manner, the body tissues of a tuberculous animal show an altered reaction to tuberculin and we now know that the presence of anatomic tubercle is necessary for the development of tuberculin hypersensitiveness. This altered condition, or "allergy" manifests itself as an acute inflammatory change in the tissues into which tuberculin is introduced (local reaction).

When the tuberculin reaches the tubercle by the blood or by the lymph, we have here again an inflammatory change. This is known as the focal reaction. This inflammatory condition is accompanied by congestion around the tubercle, by dilatation of the vessels and consequently by an increased give and take between tubercle and blood-stream. With increase in the circulation around the tubercle there passes into the blood-stream from the tubercle, something, the nature of which is not definitely known, which causes the symptoms which we recognize as the general reaction and which, if in great enough amounts, will cause death.

Tuberculin is used for one or other of two purposes, first as an aid in diagnosis, and second, as a therapeutic agent. For diagnosis, it may be applied locally by scarification of the skin as in the von Pirquet test, by inunction as in the Moro or percutaneous method, or by injection into the epidermis, the intradermic procedure of Moussu and Mantoux. These tests are quite harmless if ordinary precautions are taken. The instillation of a drop of diluted or purified tuberculin into the conjunctiva has no advantage over the other local tests and has the decided disadvantage that occasionally ulceration of the cornea with resulting opacities has followed severe reactions. The subcutaneous method depends on the general symptoms produced by absorption of substances from the inflamed tubercle, this inflammation being caused by the tuberculin which reaches the focus by the blood or lymph. This method is not without danger. It is important to remember, but, unfortunately frequently overlooked, that the various tuberculin reactions do not differentiate anatomic tubercle, which is perfectly compatible with good health from an active clinical tuberculosis. The great majority of persons above fourteen years of age have somewhere in their bodies a focus or foci of tubercle formation, the majority of adults are hypersensitive to tuberculin. A positive reaction to tuberculin, while absolutely specific in diagnosing the presence of anatomic tubercle, does not mean of necessity that there exists a diseased condition caused by active tuberculosis. Many persons have been condemned to a diagnosis of tuberculosis, merely because they have shown a positive reaction to tuberculin, whereas the cause of the reaction was a latent or healed tubercle which may have had no relation whatever to the symptoms for which they have sought advice.

Ideas as to the therapeutic value of tuberculin have undergone many changes in the past twenty-five years, and even at the present time the question of its efficacy is still undecided in the minds of the majority of medical men. The reason for this seems to lie in the very general misunderstanding of even the most rudimentary facts about tuberculin. This complicated subject will be much simplified if we confine ourselves to what we know regarding tuberculin and its action. It is well established that tuberculin causes an inflammatory reaction in and around the tubercle; by this reaction the tubercle is opened up more freely to the blood and lymph. This inflammation favors fibrosis and the consequent walling-in of the tubercle which is what we recognize as healing. Now if we can so graduate our dosage as to react the sluggish tubercle without over-reacting it, we will do good. If, however, the dose is so small that it does not cause a reaction in the tubercle, the treatment will have no beneficial effects, while if the dose is so great that reaction is excessive and uncontrollable we are doing harm.

The problem is complicated by the fact that in clinical tuberculosis we are dealing with a diseased state in which there are tubercles of varying ages and in varying stages of development and of different histological structure, some cellular, some caseous and necrotic, and some well developed with fibrous tissue. It can be readily seen that an amount of tuberculin which will react a recent cellular tubercle will have no effect on an older fibrous one, while an amount sufficient to cause an inflammation in these older firmer foci will over-react the more cellular ones. Thus no given amount of tuberculin should be expected to benefit all of a person's diseased tissue. Again our means of estimating the results of our dosage are indirect and inaccurate, depending largely on the subjective symptoms of the patients, which are notoriously inexact and misleading. Add this to the difficulty of correctly estimating the best dose to give, which must be large enough to have an effect, but not so large as to do damage, while the disease is one with a constantly changing pathologic and clinical picture, no case steadily improving and none steadily becoming worse and the complications of the subject of tuberculin therapy become apparent. While it is foolish to maintain that in tuberculin we have a "cure-all" for tuberculosis, it is equally foolish to say that it has no therapeutic activity, as some men do; and the middle course is the only safe and logical one to take, namely, that tuberculin is an agent which definitely affects the individual tubercle and so influences the course of the disease, favorably if properly administered to suitable cases, and harmfully if incautiously given. To obtain a favorable result it must be administered with an intelligent understanding of its action and of the results we hope to obtain.

PYRETIC TREATMENT.

The Treatment of Infections with Colloidal Metals. A. G. Auld,[9] in experimenting with colloidal metals, found that a certain specimen of colloidal platinum was capable when given intravenously in doses of 3 to 7 ml.

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[9] Brit. Med. Jour., Feb. 16, 1918.

to produce, within half an hour, a rigor lasting for twenty minutes or longer, followed by rise of temperature to 104° or 105° F., with, in the next few hours, perspiration, sickness with vomiting (occasionally) and headache. The temperature then fell usually to subnormal. This reaction occurred alike in normal subjects and in those suffering from diseases characterized by moderate pyrexia, namely, subacute pleuritic and pneumonic conditions, and protracted paratyphoid fever. In these the fall of temperature coincided with a great improvement in the general condition. On the other hand, these reactions were not obtained in the acute stages of pneumonia or pleurisy, nor was benefit derived. Instead of a rise, a fall in temperature of several degrees may take place (negative phase) with subsequent return to the original level, or nearly so.

When the supply of this active colloidal platinum was nearly exhausted, Auld was, for a while, unable to obtain any colloidal metallic preparation capable of producing the reaction, until he obtained a specimen of colloidal silver, which, in doses of 3 to 5 ml., acted with even greater intensity than the platinum colloid. Being informed by the manufacturers that this silver was protected in a special manner, he requested them to send the protective suspension exactly as used, which they willingly did. On trying it clinically, he was somewhat surprised to find that it reproduced very faithfully the effects of the colloidal silver itself, bulk for bulk. The protective used was given as veal peptone 0.4 per cent., with 1 per cent. glucose. It gave a violet biuret reaction. The veal "peptone," of course, was the active agent, as the effect of the glucose alone was nil.

Evidently, if the pyrogen which produced the reactions is not colloidal metal, it matters little therapeutically whether colloidal metal is present, as all pyrogenic substances in appropriate doses produce the same effects, whether killed bacteria, proteoses, nucleic acid, or protected colloidal metals, to mention only a few. The author believes that, under present conditions, typhoid vaccine is probably the best pyrogen to use. From fifty to two hundred and fifty million of killed typhoid bacilli are injected intravenously, according to the strength of the patient and the existing state of the temperature. In apyrexial cases, as in many of the arthritics, the dosage should be greater than in cases of pyrexia. The treatment is specially adapted to sluggish cases of localized infective diseases with low or moderate pyrexia. Little benefit results unless the full reaction is induced, and rarely more than one injection is necessary. An overdose is indicated by dyspnea, cyanosis and diarrhea. The injection should not be given while the temperature is high. Heart disease, high blood-pressure, and rigid arteries are contraindications.

TACHYPHYLAXIS.

The Therapeutic Rôle of Tachyphylaxis. H. Busquet[10] defines tachyphylaxis, a term first employed by Gley and Champy (1911), as the rapid immunization against a poison produced by the preliminary injection of the same poison in a dose so small as to be inactive. This protection is obtainable almost immediately after the first injection—hence, the name tachyphylaxis.

One of the best examples of tachyphylaxis is to be found in the injection of "peptone." While an intravenous injection of this substance inhibits the coagulability of the blood, it immunizes the animal against the effects of subsequent injections practised after the coagulability has become restored. Even a dose so small as to be insufficient to interfere with the coagulability of the blood, protects within a few minutes against the action of a dose that is usually effective. While the explanation of the phenomenon is not yet entirely satisfactory, the hypothesis formulated by the author would connect the symptoms ordinarily produced by "peptone" injections with multiple embolism due to intravascular clotting occurring the moment an active dose of peptone comes in contact with the blood. Shortly thereafter, incoagulability is produced. Hence, another dose now administered is devoid of effect, as this depends according to this hypothesis upon intravascular clotting.

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(10) La Presse médicale, Oct. 22, 1917.

In other words, tachyphylaxis is essentially the production of incoagulability of the blood. Thus, the author is inclined to attribute the fall in blood-pressure produced by the first intravenous injection to coronary embolism or venous thrombosis. This fall in arterial pressure cannot be reproduced by the second dose, because the blood has now been rendered incoagulable.

Whether this theory will hold or not, the facts it is aiming to explain are sufficiently well established and their practical applicability so great as to warrant the introduction of the term, "tachyphylaxis" and the application of the knowledge conveyed by it in general practise.

Thus, as has been shown by Danysz (1916), a rabbit may be killed in convulsions within a few seconds by 0.20 gm. of arsphenamine. If, on the other hand, a rabbit receive an injection of 0.03 gm., it will tolerate perfectly a dose of 0.25 gm. a few hours later.

The author demonstrated in 1916 that nucleinate of soda injected intravenously into a dog in doses of 0.002 gm. per kg. produces a considerable and prolonged fall in blood pressure. A second injection of the same dose, or one even five times as great, introduced after the effect of the first dose has disappeared, does not change the blood-pressure at all or at most but slightly. The same effect may be obtained from a preliminary dose so small as to be devoid of other effect, *e. g.,* 0.1 mg. per kg., which does not affect the blood-pressure, protects against subsequent doses that are much larger (5 to 10 mg.). The author believes that the mechanism of this action is connected with changes in the coagulability of the blood, inasmuch as a dose of 0.002 gm. per kg. lessens or abolishes its coagulability.

Chaulmoogra oil emulsion injected intravenously produces a fall in blood-pressure, that is prevented by a preliminary dose which may be as small as 0.01 mg. and incapable of modifying the manometric tracing. This oil likewise diminishes the coagulability of the blood; and the author believes it is but reasonable to attribute its tachyphylactic action to this pecularity.

Observations on organ extracts by numerous observers are quoted by the author, all of which agree in the fact that when the fall in blood-pressure caused by the intravenous injection of one dose has passed away, a second injection of the same or of another organ extract, fails to cause a lowering of pressure and that a fatal dose of an organ extract may be rendered harmless by a preliminary injection of a very small dose.

The author also believes that similar relations obtain in connection with killed microbial cultures; and cites, in support of his contention, the attempts at abortive treatment of typhoid fever by typhoid vaccine (Ichikava, 1914), or even by non-pathogenic microörganisms (Maute, 1917), as well as his own observations with Kephyr ferment.

The following therapeutic applications are suggested by the author:

The preliminary administration of a very small dose of arsphenamine to prevent the early symptoms of intolerance.

The previous injection of 0.01 gm. of sodium nucleinate to improve tolerance for a dose of 0.40 as used in the treatment of paralysis agitans by Buia (1914).

The same precautions are recommended by Vahram (1906) in connection with the intravenous injection of chaulmoogra oil in leprosy.

In the transfusion of defibrinated blood, to prevent intravascular clotting due to injection of fibrin ferment, E. Hédon (1917), on the basis of experiments in rabbits, recommends an introductory injection of a small quantity of blood for the purpose of tachyphylaxis before introducing the quantity necessary for therapeutic effect.

It is also natural to suppose that, by means of tachyphylaxis, it would be possible to safely inject, by intravenous route, sufficient amounts of the unaltered extract of endocrine glands, as the tachyphylactic reaction merely antagonizes the effects upon blood coagulability that are common to all these extracts, without producing immunity against the specific effects.

[This method is likely to assume great practical importance; *f. i.* the use of hormonal has been abandoned because of its tendency to induce collapse. If this effect could be circumvented by a tachyphylactic dose, hormonal might become of therapeutic value.—ED.]

PASSIVE IMMUNIZATION.

POLIOMYELITIS SERUM.

Immune Horse Serum Treatment of Acute Poliomyelitis. E. C. Rosenow[1] concludes that the results from serum treatment in experimental poliomyelitis in the rabbit are so strikingly favorable as to leave little doubt regarding the value of this treatment. They also emphasize the importance of recognizing poliomyelitis early. If a patient has symptoms which suggest involvement of the central nervous system, and shows an increased amount of spinal fluid, an increased number of cells with mononuclears predominating, and a positive globulin test, the serum should be administered immediately.

The serum should be injected intravenously and not intraspinally, as it has been found that intravenous injections were necessary to protect monkeys against intracerebral inoculations of virus. Intraspinal injection of horse serum has been shown by Flexner and Amoss (1917) to increase markedly the susceptibility of monkeys to poliomyelitis.

ANTIPNEUMOCOCCUS SERUM.

Antipneumococcus Serum. Rufus Cole and Henry F. Moore[2] report the results of their study of best methods of producing antipneumococcus serum. They state that, in spite of a general belief to the contrary, all kinds of animals, even the most susceptible, may be rendered actively immune to pneumococcus infection by the previous injection of non-lethal doses of living pneumococci or even by the injection of the dead bodies. While the serum of the actively immunized animals, in many cases, possesses protective and curative power, an animal may itself be fairly highly immune without the

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(1) Jour. Amer. Med. Ass'n., Aug. 10, 1918.
(2) Jour. Exper. Med., Oct. 1, 1917.

serum containing any immune bodies that can be demonstrated and without its having any demonstrable protective action, suggesting that in the reaction of resistance to, or recovery from, this infection there may be other factors concerned than the humoral ones. From this it will be seen that the accurate standardization of the protective power of antipneumococcus serum is of fundamental importance. While it seems to be possible to prepare a polyvalent antimeningococcic serum, the conditions as concerns pneumococcus are different. The different types of pneumococci have a high degree of specificity as shown by protective action and by agglutination. Active immunity to the different types seems very specific. This type specificity, which was only lately recognized, is of fundamental and primary importance in considering the practical application of immunity to therapy in this disease. Immune serum against Type 1 infection is more effective than that against any other of the specific types. Indeed, while Type 1 serum has great therapeutic value, observations which have so far been made with sera of the other types do not show that these produce distinct therapeutic effects. Hence at present the commercial production of antipneumococcic serum for therapeutic purposes should be confined to that effective against Type 1 infection. They conclude that, to be considered efficient, this serum should have agglutinating power for Type 1 pneumococcus and the power of protecting mice against large amounts of virulent culture.

In this connection the results of the study by Francis G. Blake[3] on the influence exerted by immune serum upon the metabolic activities of bacteria are of interest. On the basis of test-tube experiments, he arrives at the conclusion that: "Antipnuemococcus serum under certain conditions apparently inhibits or retards the metabolic activities of the homologous pneumococcus. The degree of inhibitory action of antipneumococcus serum parallels and is due its agglutinating power."

He also found that antistaphylococcus serum merely inhibits the liquefaction of gelatin and the formation of pigment by *Staphylococcus pyogenes aureus*, but it

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(3) Jour. Exp. Med., October, 1917.

does not inhibit those metabolic activities of *Staphylococcus pyogenes aureus* essential to the growth and multiplication of the organisms.

FUNCTIONAL THERAPY.

This term will be used, as suggested by A. Robin, instead of "Symptomatic Therapy." Under its caption will be studied those remedial agents that owe their action chiefly to modification of function.

CARDIOTONICS.

DIGITALIS GROUP.

The Modern Conception of the Action of Digitalis in Heart Failure. H. L. Flint[4] calls attention to the fact that the important factor that should determine the choice of case to which digitalis must be administered in heart failure is the nature of the cardiac rhythm, though the author wishes it understood that this does not apply to those cases of heart failure which occur during an acute infection of the heart.

If heart failure occurs in any heart, whether healthy or diseased, which exhibits a normal rhythm, that failure of the circulation is due to the ventricular muscle being unable to supply sufficient blood to the organs and tissues of the body. The increased rate of the cardiac contractions plays no part in the causation of heart failure. It is rather the means by which the central nervous system compels the heart to supply the maximum quantity of blood to the organs and tissues of the body. Hence any attempt to slow the heart by means of digitalis can serve no useful purpose as a means of treating cases of heart-failure with a normal rhythm. This has been shown, among other, by research work carried out on soldiers suffering from irritable heart. Daily doses of 45 to 60 minims of tincture of digitalis had no effects on pulse-rate, blood-pressure, respirations or symptoms. The important line of treat-

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(4) Practitioner, February, 1918.

ment to adopt in such cases is to relieve the heart muscle by diminishing the demands of the tissues for the blood. The extent to which the heart must be relieved of work varies with the degree of heart failure present. In a slight degree of heart failure, a little more rest than usual is all that is required. In the more serious cases, this will involve absolute rest.

The rhythm of the heart is said to be abnormal, when the stimulus giving rise to its contractions starts in some part of the heart other than the sino-auricular node. Thus the occurrence of an extra-systole in an otherwise normal rhythm does not constitute an abnormal rhythm, but an abnormal contraction in normal rhythm. The only two forms of abnormal rhythm commonly met with are: auricular fibrillation and auricular flutter.

In auricular flutter, the auricles contract regularly and rapidly, usually about 300 per minute; there is always a degree of heart block present; the ventricles usually responding to every second auricular contraction, so that the ventricular contractions are regular and usually half the auricular rate. If the ventricles only respond to every third or fourth auricular contraction, their rate will, of course, be slower. The electro-cardiagraph in such a case shows that the stimulus for contraction does not originate at the sino-auricular node, but in some other part of the auricular wall which has become more irritable than this node.

In auricular fibrillation, the stimulus for contraction likewise does not arise in the sino-auricular node and then pass through the auricle in a normal rhythmical manner, but each muscle fiber enters into small fibrillary contractions, independently of the other fibers. The auricle does not contract as a whole, but remains in the condition of diastole. The ventricular contractions are in response to stimuli received from the fibrillating auricle through the auriculo-ventricular bundle. These stimuli are very irregular; and, as a rule, rapid.

In both auricular flutter and fibrillation, the rate of the cardiac contractions is no longer under the control of the central nervous system. Thus the heart rate is not increased by change of posture. Hence the increase in the heart rate in an abnormal rhythm is not due to an attempt on the part of the heart to satisfy the demands of the tissues for an increased supply of blood, but to a pathologic condition of the auricular wall.

As to the recognition of these conditions, Flint notes that, failing the use of instrumental methods, one must rely on symptoms and physical signs: A rapid and regular pulse of 130 to 160 per minute when the patient is at rest, which is not increased by effort, usually indicates auricular flutter. In auricular fibrillation, except in those cases under the influence of digitalis, the pulse is rapid and exhibits a very grotesque form of irregularity, no two consecutive contractions being of the same strength, and the pauses between the beats continually changing. In the days before auricular fibrillation was recognized, this form of pulse received various names, such as: the mitral pulse, delirium cordis, or pulsus irregularis perpetuus. Mackenzie estimates that 60 to 70 per cent. of all cases of heart failure with dropsy are suffering from auricular fibrillation. In a patient who is known to have previously had an auriculo-systolic mitral murmur, which is now found to have disappeared, one of the abnormal rhythms is certainly present. For fuller description of the symptoms and physical signs of auricular flutter and fibrillation the author recommends "Clinical Disorders of the Heart Beat" by Lewis.

Stimulation of the vagus in abnormal rhythms has no effect upon the auricles; but the ventricular contractions are very much reduced in rate, due to depression of the function of conductivity of the auriculo-ventricular bundle. Digitalis, in stimulating the vagus and thereby depressing the function of conductivity of the auriculo-ventricular bundle, increases the degree of heart-block; and thus, by preventing a too rapid passage of stimuli from auricle to ventricle, slows the ventricular rate. If heart failure is slight it is possible that reducing the heart rate by digitalis to, say, 70 or 90 a minute by the regular administration of this drug may enable the patient to continue his ordinary occupation for years with comfort. In more severe cases it is not only necessary to cut down the exertion made by the individual, or to insist, perhaps, on his complete rest; but also to take active steps to reduce the rate of the ventricular contractions. This can only be accomplished by giving digitalis, and so producing a greater degree of heart block.

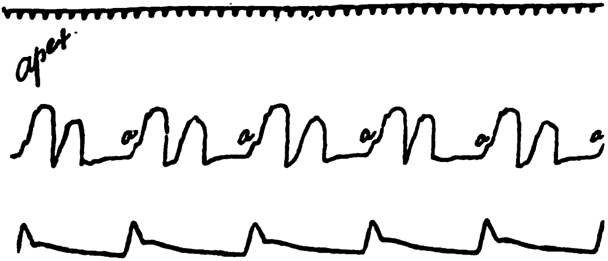

Fig. 3.
Coupled rhythm. The half-rhythm of the pulse is manifestly not due to true alternation of the heart, but to alternate premature contractions of the ventricle too feeble to send the wave to the wrist.

Method of Administration and Dosage. Digitalis must be given in large doses and pushed until its physiological results are obtained. Mackenzie recommends

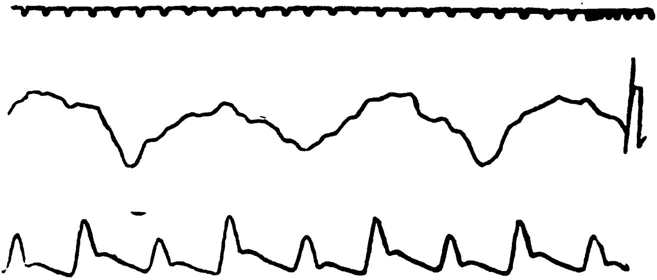

Fig. 4.
From a female patient with cardiac and arterial disease, with dropsy. Shows pulsus alternans after 2⅛ drachms of tincture of digitalis; pulse rate 105 per minute.

giving 4 ml. (1.3 ml. t. i. d.) of the tincture per day until the pulse-rate is slowed, or some of the other signs of sufficiency of the drug are observed. This effect usually occurs from the fifth to the seventh day. Then the drug should be stopped entirely until signs of digitalis sufficiency have passed off, which usually takes a couple of days or so; and, as soon as the pulse-rate begins to increase, it should be administered in half the original dose. This second dosage is then adjusted until that dose is found, which keeps the pulse-rate fairly slow and makes the patient feel most comfortable. The patient should, as a rule, be kept in bed during the first week, whilst the large initial doses are being administered. Signs of sufficiency of digitalis are: slowing of the pulse-rate to between 70 and 90 per minute, bad dreams, headache, vomiting, diarrhea, diminished excretion of urine, and the development of occasional extra systoles. The appearance of coupling of the heart beat (see Fig 3), which is so characteristic of the administration of full doses of digitalis in cases of auricular fibrillation, is an urgent indication that the drug must be stopped at once. If the drug is continued, sudden death may occur.

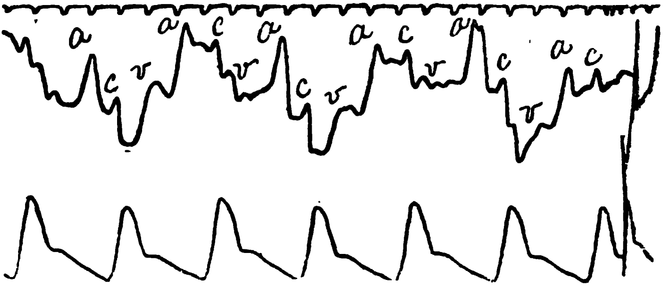

Fig. 5.
Taken from the same case as Fig. 2, after 7 drachms of tincture of digitalis. The pulses are equal in strength; pulse rate 82 per minute.

[The practitioner will do well to assimilate this view of the action and use of digitalis.—Ed.]

Digitalis in Heart Disease with the Pulsus Alternans. J. Davenport Windle,[5] as a result of experience with over 100 cases, arrives at the conclusion that digitalis does not deserve the ill repute it bears for the treatment of these cases. However, the author finds it necessary

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(5) Quarterly Jour. Med., July, 1917.

to point out that considerable confusion exists regarding the nature and significence of pulsus alternans. A true pulsus alternans, which is invariably the expression of an overtaxed heart, is characterized by a tracing showing the sequence of a strong and a weak pulse which follow each other at equal time intervals, or the weaker pulse may occur a trifle late; but, since the delay is no more than one-tenth of a second, it is too short to be appreciable by touch, so that clinically the rhythm of the pulsus alternans is always a regular one. It is necessary to distinguish it from more common pulse rhythms having variations in strength, which are sometimes closely like the pulsus alternans, and with which they are frequently confused. In clinical works the term "pulsus' alternans" is still sometimes used to designate the irregularities in pulse force, which result when an extrasystole, causing a feeble pulse, succeeds each normal beat; and for the yet greater disparities in rhythm and force present in the completely irregular pulse of auricular fibrillation. For diagnosis it is all-important to recognize that the feeble beat of the pulsus alternans does not occur prematurely under any circumstances; and that the pause after it, although it may be a trifle shortened, is never prolonged. A pulse rhythm of the first kind just mentioned, that is to say, extra-systolic bigeminy, not uncommonly ensues in patients under the full influence of digitalis, and in consequence of its confusion with the pulsus alternans, the misconception has arisen that digitalis has the power of causing the pulsus alternans.

The prognostic importance of true pulsus alternans is very great in patients with arterial disease. Pulsus alternans is occasionally present for weeks or maybe a few months without obtrusive symptoms referable to the heart; but, when such is the case, it can be predicted that, sooner or later, severe heart failure and dropsy will inevitably ensue. The average duration of life in cases observed by the author from the inception of the pulsus alternans has been about two years, in a few cases three years.

The author does not agree with the statement generally made that when digitalis is given to patients in sufficient doses the drug occasionally induces the pulsus alternans; and that, if digitalis is given to patients with heart disease who already show the pulsus alternans, both the alternation in pulse strength and the patients' symptoms are likely to become worse under its use. On the contrary, his experience indicates that the drug has little, if any, power to bring about the pulsus alternans in healthy or diseased conditions of the heart; and that, in cases of heart disease in which this form of pulse is present, the pulses frequently become more equal in force and not uncommonly disparity in strength of the beats is temporarily abolished under the use of the drug, and that the patients' symptoms for the time being are improved in all respects (Figs. 4 and 5). Moreover these good results not seldom ensue, coincidentally with a considerable rise in the blood-pressure; and the symptoms of angina pectoris, from which patients with the combination of myocardial and arterial disease with the pulsus alternans so commonly suffer, may for the time cease. The author admits that, to give digitalis to a patient with degenerated arteries, high blood-pressure, and anginal symptoms suggests the probability of dangerous effects. Nevertheless it is the only drug that affords some lasting immunity from these attacks to many such patients. In order to obtain these effects, a sufficiency of the drug is necessary; generally speaking, the lower the blood-pressure and the more irregular the force and rhythm of the pulse the larger the quantity of digitalis required. In bad cases, fifteen minims four times a day is usually enough, which dose should be continued until the pulse falls to about the normal rate. If then there is no improvement the drug can be safely pushed until nausea ensues, or the heart takes on a coupled rhythm, which in the author's experience it does more readily in the pulsus alternans than in any other pulse rhythm except complete irregularity of the pulse. Vomiting or long runs of coupled heart-beats (Fig. 3) are indications that the drug should be stopped. No more good can be expected, and harm may rise from its further use. Generally after leaving off the digitalis all the bad symptoms return within a few weeks; but improvement, as marked as before, follows the further use of the drug in full doses. Relapses, however, ensue again and again in the subsequent course of illness of such patients; and finally, in spite of all that is done, the symptoms of heart failure become progressively worse. Ultimately, for a long time before the fatal event, no drugs have any effect on the symptoms or pulse, except morphine. Hence the functional cure which usually results under digitalis treatment in the early stages of the illness is only temporary. Even with prolonged rest and the greatest care that can be taken in all respects, symptoms of severe heart failure recur. The author believes that the continued use of the drug in suitable doses delays their inevitable occurrence.

"In the terminal phases of the illness, the breathing is always distressed, restlessness is very great, the patient can not lie down, and sleeps perhaps only for a few minutes at a time. Morphine is now indispensable; it quiets the breathing, relieves the subjective symptoms, and maybe induces sleep for three or four hours at a stretch; the indirect effect of this relief on the heart is often remarkable."

An intimate relation subsists between the rate of pulse and the continuance or abolition of alternation in its force, and this association appears, at least in part, to be the explanation of the changes in pulse strength under digitalis. The slowing of pulse-rate in itself is sufficient to account for the cessation of alternation, and all the author's records evidence the same fact, namely, that alternation is not replaced by equality in pulse force in cases under digitalis, unless at the same time the pulse-rate becomes slower. The rate of pulse at which alternation ceases varies widely in different cases; generally speaking, it is unusual for alternation to persist when the pulse falls to about the normal rate; but occasionally it does so, and exceptionally the pulsus alternans continues when the rate is reduced somewhat below the normal. "These relations have prognostic significance, serving to some extent as an index of the functional efficiency of the heart. Inasmuch as alternation expresses a disproportion between the heart's strength and its rate of contraction, it follows that the slower the rate of a pulsus alternans the greater the exhaustion it signifies. A slow pulsus alternans, that is to say, one of about normal rate, is not met with except in cases of senile cardio-vascular degeneration; and it is always of particularly unfavorable prognosis when the pulse-rate falls under digitalis to 70-80 per minute and alternation persists.

"In cases of valvular heart disease of rheumatic origin with the pulsus alternans, the circumstances under which alternation in the pulse ensues are different in this respect, that it is never the first manifestation of an unsound heart, as it is in the aged with cardiac and arterial sclerosis; it supervenes only in patients who are already the subjects of severe heart failure, and it signifies not the condition which is the primary cause of the heart failing, but a superadded embarrassment to the circulation. As a rule it first occurs coincidently with increase in dilatation, the onset of dropsy, or other conditions which entail further calls upon the reserve of the heart's strength, which it is unable to meet by full contractions. If the work of the heart is eased, by restoration of its tone, the disappearance of dropsy and so forth, then the pulsus alternans ceases, and may remain absent so long as the factor which was its immediate cause continues in abeyance. These considerations explain why alternation in the pulse is not usually persistent from the beginning to the end of rheumatic cases, and perhaps also why it is not so readily reinduced after its abolition under digitalis treatment as it is in the degenerative heart lesions of the aged."

Influence of Digitalis and Digitoxin on the Blood-Pressures in Man. Cary Eggleston[6] from a careful study made on a series of fourteen hospital patients, who received digitalis in the form of a purified extract diluted with lactose and made into capsules, each containing 2.5 cat units*, or an amount equivalent to 2.5 ml. of a high grade tincture, or digitoxin in the form of tablet triturates or of the granules of Nativelle's digitaline crystalisee, both preparations having been standardized on the cat, found that the administration

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(6) Jour. Amer. Med. Ass'n., Sept. 22, 1917.
*Page 146.

of large doses of digitalis or digitoxin has very little tendency to elevate the systolic pressure. It was increased by 11 mm. of mercury in one and 15 mm. in a second case. In one case was the systolic pressure materially reduced, namely, by 23 mm. of mercury. On the other hand, the diastolic pressure was significantly lowered in seven, or 50 per cent. of the cases, while it was never significantly raised. "It is evident, therefore, that digitalis and digitoxin have very little influence on the systolic pressure in either direction, but they tend to produce a significant reduction in the diastolic and, therefore, a material increase in the pulse pressure."

The conclusion seems abundantly warranted to the author that there is no evidence that either digitalis or digitoxin has any direct action on the vessels when given to man even in large therapeutic doses. These drugs produce no vascular changes unless given in amounts several times those which are promptly fatal, or perfused through the vessels in concentrations much greater than could ever be reached in man. The changes in systolic, diastolic, and pulse pressures in man are probably due to increase in the systolic volume output of the heart. It may be therefore that digitalis, by improving the circulation, leads to improved pulmonary ventilation with the relief of cyanosis and the abolition of the vasoconstrictor effect of carbon dioxide on the center; and that the improved circulation results in the more normal functioning of the various organs and tissues of the body that maintain circulation at its most efficient level. The observation that the pulse pressure is increased in the majority of cases in which there is material clinical improvement as a result of the use of digitalis is in harmony with this hypothesis, since the pulse pressure is, to a certain extent, a measure of the efficiency of the circulation through the periphery.

The Special Indications for Ouabain and Digitalis in Cardiac Therapeutics are discussed by H. Vaquez and R. Lutembacher.[7] They point out that the chief difference between these two cardiotonics is that digitalis possesses a powerful effect upon the impulse conduction and the chronotropic function, but no effect upon the

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(7) Paris méd., April 27, 1918.

heart's tonicity; while ouabain (strophanthin) has a special effect upon the heart's tonus and contractility, but practically none upon conductivity.

Thus in auricular fibrillation, digitalis, by lessening intracardiac conductivity, blocks the feebler auricular contractions and permits only the stronger ones to pass. This results in a slowing of the pulse and a better filling of the ventricles with blood to be expelled by their contraction. All the symptoms in such a case are thus improved; and, while the heart may not be made perfectly regular, tachy-arythmia is replaced by brady-arythmia.

When, however, myocardial tonus is lost, digitalis is not only useless, but actually detrimental. For it aggravates cardiac dilatation by the slowing of the contractions that it produces which favors still further overfilling of the ventricles during the prolonged diastolic period. This condition may arise even in cases that, at first or for a long time, have well responded to digitalis. Finally, however, it may be impossible to obtain any improvement whatever from digitalis, no matter what the dose or the form in which it is employed. Something seems to be lacking now, that digitalis can not remedy: it is loss of tonus.

It is in just such cases in which digitalis does not act, or has lost its effect, that ouabain is especially likely to be valuable. If the patient has received digitalis medication, just previously, it is well to administer symptomatic medication for five or six days, and then to give 0.25 mg. of ouabain, to be followed by 0.5 mg. 24 hours later. It is dangerous to administer ouabain immediately after a course of digitalis. If, in such a case, ouabain does not give completely satisfactory results, it is well to take resource again to digitalis in large doses, as often ouabain seems to be capable of reactivating digitalis, probably by restoring cardiac tonus sufficiently for digitalis again to exert its action. On the other hand, it is not wise to combine the two remedies, as each of them constitutes an important part of a therapeutic plan.

Loss of cardiac tonicity which is considered by the authors to be the special indication for strophanthus, may be of acute onset or slowly progressive. When of acute onset, it manifests itself in attacks of angina pectoris or of pulmonary edema. In the latter condition, the best procedure is to perform, first, a copious venesection, removing 400 or 500 mils of blood; and then to inject 0.5 mg. of ouabain. This usually produces marked relief. If comfort is not obtained, the authors would not hesitate to give 0.25 or 0.33 mg. 6 hours after the first injection. The first objective effect of the action of ouabain is generally a rise in blood pressure, and when this rise does not occur it is an omen of grave prognosis.

Another condition in which ouabain is superior to digitalis is in the sudden appearance of acute cardiac insufficiently, with marked congestion of the liver, which would present a great obstruction to the absorption of digitalis administered by mouth. In such cases, the intravenous injection of ouabain as previously described constitutes the remedy of choice.

When, by reason of dilatation of the auricle, a mitral patient is suffering from pain in the scapular region, sufficiently severe to make sleep impossible, and this is accompanied by tachycardia, which frequently precedes complete arrhythmia, digitalis will prove itself inactive, while ouabain is capable of rendering great service.

Another particular indication for ouabain is to be found in a mitral case, with cardiac insufficiency, in which occurs periodic slowing of the pulse, probably due to heart block. In any case in which there is a tendency to heart block or Stokes-Adams syndrome, strophanthus is much superior to digitalis, which latter aggravates disturbances due to impairment of conductivity.

Finally, the authors add, they have used ouabain, with encouraging results, in the cardiac collapse of such acute diseases as typhoid fever or pneumonia.

The principle contraindication to ouabain, the authors believe, is to be found in advanced cachexia with general serous infiltration and multiple effusions in the pleura and the peritoneum, and inflammatory pulmonary complication. Another contraindication is infectious endocarditis.

Owing to considerable variation in the activity of different commercial strophanthins, the authors used exclusively, ouabain prepared by Arnaud from *strophanthus gratus*. This substance must be injected intravenously, as on subcutaneous injection it is liable to produce most unpleasant local reactions, even necrosis of the cellular tissue. When it is given by mouth, phenomena of intolerance may appear before any other effect has been obtained. The useful dose of this substance for intravenous injection is 0.5 mg. dissolved in 1 ml. of water. A dose of 0.25 mg. is hardly sufficient, unless there is no urgency and one desires to test the patient's susceptibility, and to render absolutely harmless the final injection of 0.25 mg. A larger dose is liable to produce undesirable effects, such as malaise, nausea, and even vomiting. Ordinarily, a dose of 0.5 mg. may be repeated every 24 hours for several days; and such course may be repeated at intervals of eight or ten days.

The Administration of Digitalis. Joseph H. Pratt[8] points out that the directions for the administration of digitalis given by Withering in 1785: "Let the medicine be continued until it either acts on the kidneys, the stomach, the pulse, or the bowels; let it be stopped upon the first appearance of any one of these effects," were conclusively demonstrated to be correct by Sir James Mackenzie over a hundred years later. Failure to obtain results in suitable cases is due (1) to the employment of too small doses, and (2) to the use of weak or inert preparations.

Up to the time of the war we have always imported our supply from England and Germany and no American commercial house is yet supplying a digitalis as strong and reliable as the titrated leaf put out by Caesar and Loretz of Halle. The author points out that, in spite of the fact that excellent digitalis both wild and cultivated grows on American soil, the large wholesale drug houses supply an inferior digitalis, and there is great difficulty at this time, and there has been for the past year, in getting good preparations. Steps should be taken to remedy this difficulty.

Though slowing of the pulse is still generally regarded

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(8) Jour. Amer. Med. Ass'n., Aug. 24, 1918.

as a measure of digitalis action, the author's observations confirm the findings of Mackenzie (1911) and Cohn and Fraser (1914) that the drug rarely slows the pulse except in auricular fibrillation. Slowing of the pulse in the vast majority of cases can be brought about readily and quickly if an active preparation is given in the proper amount. Physicians should learn to recognize the presence of coupled beats with the stethoscope. When they appear, the drug should at once be discontinued. Vomiting may be preceded by a day or two of complete anorexia. When this loss of appetite develops suddenly, the drug should be discontinued, as distressing nausea and vomiting will follow if more digitalis is given. It makes no difference whether the fresh tincture, or the powered leaf in capsules or in pills is used. The use of the infusion should be condemned. If a tincture is employed mils. or minims, not drops, should be used, as it usually takes from 35 to 40 drops to equal 15 minims or 1 ml. The ordinary dose of a strong digitalis preparation is 1 ml. of the tincture or 0.1 gm. of the powder three or four times a day. The physiologic effect is usually obtained when 2 to 2.5 gm. of the leaf are taken within from five to seven days. If more rapid action is desired, 1 gm. may be given within the first twenty-four hours. In auricular fibrillation, after the patient has been well digitalized, the slow pulse should be maintained by the constant administration of sufficient digitalis to maintain the rate below 80 and to prevent the occurrence of a pulse deficit.

The "German digitalin" is a mixture of alkaloids of varying strength. It is cheap; but there seems no justification for its use. The French digitalin, obtained by the method of Homolle, is an entirely different substance. It consists chiefly of pure digitalin (*digitalinum verum of Kiliani*). It is sold in the form of Nativelle's granules. Each granule contains (0.25 mg.), and is equivalent to (0.1 gm.) of good digitalis leaf. It is a trustworthy preparation and deserves more extensive use in this country. Digalen has been found to be a weak digitalis preparation, the claim that it does not produce nausea or vomiting in therapeutic doses seems justified by its lack of strength. German "digipuratum" or the Swiss "digifolin" naturally give better results than do weak tinctures. Using the strong titrated leaf, the author never found any advantage in giving digipuratum.

A warning should be sounded against the use of the tincture of strophanthus as a substitute for digitalis. The reason for this is the variability and uncertainty of its absorption from the gastro-intestinal tract. Strophanthin or ouabain, on the other hand, is a remedy which, if given intravenously, may save lives that would otherwise be lost. The author has obtained only benefit from strophanthin; but he never gives more than 0.5 mg. of the amorphous strophanthin at a dose, and has never repeated. it oftener than once in twenty-four hours. Burroughs and Wellcome supply amorphous strophanthin in tablets of 1/500 grain of intravenous use. The author has recently used Burroughs and Wellcome's preparation, giving four tablets equal to 1/125 grain or 0.52 mg. in a single dose with benefit and without untoward results. As improvement has occurred in forms of heart failure that are rarely, if ever, relieved by digitalis, it suggests at least that strophanthin given intravenously exerts an effect on the contractility or tonicity of the heart muscle that is not obtained from digitalis in therapeutic doses.

Eggleston Dosage of Digitalis. R. Edwin Morris[9] considers the Eggleston dosage one of the greatest recent advances in digitalis therapy. It is based upon the "cat unit," a term devised by Hatcher in relation to digitalis dosage, which may be defined as that amount of drug calculated per kilogram of cat which is just sufficient to kill, when slowly and continuously injected into the the vein, this being expressed in milligrams of the drug whether it be the pure principle or the leaf.

Formerly, when a patient was bordering on the condition "in extremis," it was well said, "he would either die or get well before digitalis could get a hold."

The method of Eggleston dosage is as follows: "First the patient is cardiographed and note is made whether any digitalis effect is evident. If negative, the full dose

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(9) Colorado Med., September, 1917.

is given and if the condition is urgent, even though there may be a digitalis history shown by the cardiogram, the full dose is also given, for should intense "minor toxic symptoms," evidenced by extra-systoles, nausea, vomiting, partial heart-block, and sinus arrhythmia, develop the dose could still be stopped any time within the twenty-four hours. If a digitalis history is developed by the cardiogram under ordinary conditions, then a cut of 15 per cent. is made in the Eggleston dose. If a full dose is indicated, a standarized preparation is selected, and the patient's weight obtained. When administered orally, the average dose of the tincture is about 0.146 cat units, or 0.146 ml. per pound of patient's body weight. Thus, if the patient weighs 130 pounds, then 0.146x130=18.9 ml., or about two-thirds of an ounce. This is to be given in twenty-four hours. If the infusion is to be given, the dose is six and two-thirds times the dose of the tincture. The dose is given in four portions in twenty-four hours, with six hours between them, first giving half the amount, then one-quarter, then one-eighth and again one-eighth." If one has not a standarized digitalis he may proceed as above, taking as the "cat unit" 100 mg. using about 0.145 ml. of the average tincture times weight, and give in broken doses as above, six hours apart.

Strophanthus Much More Toxic on Hypodermic Than on Oral Administration. As the use of strophanthus in therapeutics as a heart tonic is becoming more wide-spread from year to year, and the greatest trouble and confusion regarding dose has been experienced, when clinicians began to follow the general tread of recent medication and to administer strophanthin hypodermically or intravenously, L. W. Rowe[10] undertook experiments to determine the degree of toxicity of various strophanthus preparations by three different methods of administration, namely, oral, subcutaneous and intravenous. The animal used throughout the experiment was the guinea-pig. The following table summarizes his results:

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(10) Therap. Gaz., August, 1917.

RATIO OF M.L.D.'S OF THE SAME PREPARATION BY DIFFERENT METHODS OF ADMINISTRATION.

	Subcutaneous to Oral.	Intravenous to Oral.	Intravenous to Subcu.
Kombe Strophanthin ...	100 times	128.6 times	1.28 times
Ouabain	66.6 times	100.0 times	1.50 times
Tr. Strophanthus	44.4 times	80.0 times	1.80 times
Strophanthone Dil......	100.0 times	133.0 times	1.33 times

"It is thus apparent from this table of relative toxicities that the satisfactory therapeutic dose of any of these preparations for intravenous or subcutaneous use cannot be derived from the previously determined therapeutic dose for oral administration by the usual rule of giving 1/2 to 1/4 as much. With ratios of toxicity subcutaneously to orally ranging from 100 to 44 times for the different preparations, serious results would be almost certain to follow the subcutaneous administration of one-half the therapeutic oral dose."

"The view held by Cushny that because of the glucosidal nature of strophanthin the abnormally low oral toxicity is largely due to destruction of the strophanthin in the alimentary canal by the ferments of the digestive tract, is a very logical and satisfactory explanation of the peculiar action of strophanthus. If this be true, the oral administration of strophanthus preparation is illogical and certain to cause confusing results, since the destruction and absorption will not be uniform. The absorption following the hypodermic administration is much more rapid and certain, since there is slight opportunity for the destruction of the active principle. The greatest caution must be observed, however, particularly in the intravenous use of strophanthus preparations, that the dose is not too large." Strophanthin for hypodermic or intravenous use is usually placed on the market in 1-ml. ampoules of a 1 to 1,000 solution. For intravenous administration 0.5 ml. of such solutions should be large enough to produce the desired therapeutic effect. Ouabain or gratus strophanthin has been recently recommended for hypodermic or intravenous use because of its purity and supposed uniformity. Inasmuch as its average activity is about twice that of Kombe strophanthin it should be borne in mind that only half as large a dose should be given.

Digitalis and the Present Shortage in Drugs. Robert A. Hatcher[1] states that, while digipuratum like many other specialties exerts a satisfactory cardiac action, it is in no way essential, since exactly the same actions can be induced by official members of the group, in the hands of any one who masters the really simple technic of administration. In those relatively rare cases, in which immediate relief is imperative and which require intravenous or intramuscular administration, the typical digitalis action can be induced immediately by the intramuscular or intravenous injection of strophanthin or chrystalline ouabain. Though the action of an intravenous dose of strophanthin or ouabain is not so lasting as is that of a corresponding dose of digipuratum, it lasts until it can be supplemented by the oral administration of digitalis. All drugs, preparations and active principles of this group, without exception, cause nausea and vomiting in overdoses through their action on the vomiting center in the medulla—not through any direct action on the stomach—hence it can not be avoided by any mere change in the mode of administration or mere choice of preparation, but only by proper regulation of the dosage. There is no difficulty in getting standardized digitalis preparations, and these do not deteriorate rapidly. Slight deterioration is not important, because the drug must always be given until a definite action is induced. Tincture of digitalis contains only traces of fat, and that is no more disturbing to the stomach than an equal amount of other fixed oils or fats.

The Deterioration of Tinctures of Digitalis. Paul S. Pittenger, and H. K. Mulford,[2] studied the rate of deterioration of U. S. P. tincture of digitalis as compared with "fat-free" tincture of digitalis. This latter was prepared by percolating the drug with benzin until a small quantity of the percolate evaporated to dryness on a watch crystal left no trace of fat, thus proving that the fat had been entirely removed from the drug. The drug was then spread out on paper until the benzin

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(1) Jour. Amer. Med. Ass'n., Nov. 3, 1917.
(2) Jour. Amer. Phar. Ass'n., March, 1918.

evaporated. The drug was then moistened, repacked in the percolator, macerated, and percolated with fifty per cent. alcohol to tincture strength. As there is no satisfactory chemical method for assaying digitalis, the preparations were tested by the Reed and Vanderkleed Guinea-Pig Method, which consists in determining the minimum dose per two hundred and fifty gram body-weight of animal necessary to cause death of the animal within twenty-four hours, when the preparation is subcutaneously injected. The standard for tincture of digitalis is 1.0 ml. per two hundred and fifty gram body-weight of animal. Practically every sample showed marked deterioration, some samples deteriorating as much as 75 per cent. in seven months. These results, therefore, tend to prove that in most cases tincture of digitalis not only deteriorates but deteriorates very rapidly. The results also show that the "fat-free" or "defatted" tinctures of digitalis do not deteriorate more rapidly than the regular U. S. P. VIII. tincture, as the ten "defatted" tinctures examined only show an average deterioration of 32 per cent. for the seven months' period of test, whereas the five U. S. P. VIII. tinctures tested show a deterioration of 44.6 per cent., for the same period of time.

CAMPHOR.

Dosage of Camphor in Childhood. H. Koplik[3] considers camphor the most satisfactory mild cardiac stimulant in the pneumonia of infancy and childhood. After its injection he has found the pulse stronger, but only for a short time. Inasmuch as it is also an expectorant, its use is justified in two directions. It may be given, dissolved in oil, hypodermically, at three-hour intervals, in doses of 0.06 gm. for every year of age, up to 0.18 to 0.24 gm. To the new-born it may be administered in doses of 0.015 to 0.030 gm.

The Prolonged Use of Camphor in Chronic Heart Disease. Theodore Zangger[4] gives camphor to all his *old* patients with heart trouble, such as chronic weakness

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(3) Jour. Amer. Med. Ass'n., Nov. 17, 1917.
(4) Lancet, Jan. 26, 1918.

of the heart's action, slight insufficiency of the heart, dyspnea on slight exertion, irregularity of pulse. They all showed decided improvement, such as he previously had not experienced in similar cases treated without camphor. Camphor increases low blood-pressure. On the other hand, high blood-pressure is often decreased. Camphor should take the place of alcoholic stimulants, which certain physicians continue to recommend as heart stimulants.

The treatment may be given by means of injections of 0.10 gm. of camphor in oil once or twice daily; or by mouth, using 10 or 15 drops of spirit of camphor on sugar two or three times a day.

Regarding the mode of action, Zangger,[5] quotes Professor Marfori of Naples, who in "Il Policlinico" June, 1917, "calls attention to the fact that, when the isolated mammalian heart is poisoned by chloral so that its pulsations are hardly noticeable, they can rapidly be stimulated to renewed activity by means of camphor. In the intact animal this improved activity of the heart is accompanied by vaso-dilatation, which tends to lower arterial pressure.

To determine whether the prolonged ingestion of camphor has an unfavorable influence, H. E. Sigerist[6] carried out prolonged feeding experiments upon rabbits, by means of injections of 10 per cent. camphorated oil. The only unfavorable result noted was a slightly slower gain in weight as compared with the control animals. By means of special experiments to determine the functional power of the left and of the right ventricle of the heart, Sigerist found that the heart of the camphor animals was slightly more powerful than that of the controls. Necropsy showed that there was certainly no hyperthrophy of the heart, contrarily, the heart mass seemed to be slightly less. Microscopic examination of the heart muscle, showed no pathologic changes whatsoever. Camphor was found incapable of antagonizing, or improving the resistance against heart poisons, such as phosphorous and diphtheria toxin.

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(5) Cor.-Bl. f. Schweiz. Aerzte, Dec. 22, 1917.
(6) Ibid.

EPINEPHRINE AND PITUITARY EXTRACT.

Sublingual Administration of Epinephrine. E. A. Tracy[7] claims that a dose of 1 to 3 drops of adrenaline 1/1000 solution (the posterior pituitary extract likewise) can be easily got into the blood-stream by the sublingual method of medication. In the young, after mopping with dry cotton the sublingual space, the solution can be dropped into the space, and osmosis of the hormone into the blood-stream takes place in a few minutes. In adults, the dose can be dropped on a pellet of cotton and this placed in the sublingual space and retained there for ten minutes or twenty. Suprarenal tablets, powdered and placed in the sublingual space, insure a more certain introduction of the epinephrine content into the blood-stream, than by the ordinary method of swallowing them at once. By administering a little every three of four hours, we approach nearer the physiologic induction of this hormone into the blood-stream, than by a large dose at long intervals.

In surgical cases with low blood-pressure, the author considers it advisable to administer a large dose of epinephrine, at least 10 minims, by the sublingual method, before general anesthesia. This procedure is especially necessary in the case of individuals who respond to skin stroking with no, or but faint reflex systole. Such are cases of status lymphaticus; and before operation or general anesthesia the epinephrine in the blood should be provided for, lest its lack prove fatal.

The Effect of Pituitary Injections Upon the Blood-Pressure of Fever Patients. H. B. Schmidt[8] studied the effect of from 1 to 1.5 ml. of extract of the pituitary gland (pituitrin, P. D. & Co.), injected deep into the muscle of the arm. While the systolic blood-pressure was not altered in any constant manner, the dyastolic blood-pressure rose in the great majority of instances. This rise was usually apparent within fifteen minutes after the injection and reached its maximum in thirty to forty-five minutes. It amounted in some instances to 15 mm. Hg., or more. No effect on the pulse

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(7) Med. and Surg., January, 1918.
(8) Arch. of Int. Med., June, 1917.

or blood-pressure was observed when the pituitary extract, in doses of 2 ml., or when pituitary substance, in doses of 1 gm. of the desiccated gland, was administered by mouth.

Adrenaline and Hypophysis Medication in Asthma. R. Bensaude and L. Hallion[9] believe that this combination acts better than either of the ingredients administered by themselves; though each of them gives very good and very prompt results in the asthmatic crises. While the action of hypophysis extract is slower than that of adrenalin, it is also more lasting; and it not only relieves the actual paroxysm, but also seems to have a tendency to postpone recurrences.

The authors used sterile ampoules containing 1 ml. each of a fluid representing 0.0005 gm. of adrenaline hydrochloride and, in addition, 0.25 gm. of fresh hypophysis in the form of an albumin-free extract. Generally 1 ml. a day sufficed for an adult. In one case, three such injections used within 12 hours produced no bad effect. O. Weiss (1912) has used, on himself, quantities of the mixture at least five times as large, without unfavorable result.

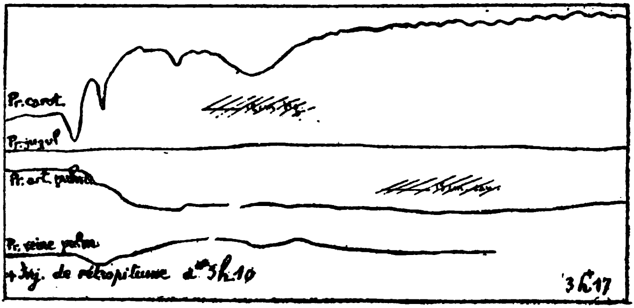

Fig. 6.
Comparison of the effects of extract of Hypophysis on the blood-pressure in the pulmonary and aortic systems; arteries as well as veins. It will be seen that the pressure is lowered in the pulmonary artery at the same time as it is raised in the carotid.

The authors report a series of 56 patients suffering from essential asthma who obtained, in nearly every

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(9) Presse méd., April 8, 1918.

case, relief of the asthmatic attack. The effect almost always shows itself within two to five minutes; and a single injection has generally been sufficient to check an attack. Occasionally the paroxysm is not completely relieved, but it is made very much less severe. When daily injections were received, subsequent doses seemed to have a greater effect than the previous ones. Increase in dose has never been found necessary, as habituation does not seem to take place. Thus, one of their patients has used the same dose for about four years always with the same success. While it is difficult to be certain of it in so capricious an affection as asthma, it seemed that, in successful cases, the intervals between attacks were decidedly lengthened.

There were, on the other hand, five cases of essential asthma in which this treatment failed completely. In all cases in which the first injection gives no relief the authors found it useless to continue, though they believe that larger doses than those employed might have been of no use in the refractory cases; however, they have never exceeded the dose stated above.

Patients who have been in the habit of relieving their attacks of asthma by morphine injections were unanimous in their preference of the adrenaline-hypophysis treatment. As one patient expressed it, the morphine suppresses personal sensibility without suppressing the attack, while the adrenaline-hypophysis mixture overcomes the attack without impairing sensibility.

In the great majority of cases, the injections do not produce the slightest disagreeable effect; but sometimes, especially after the first injection, patients feel a slight tremulousness, sensations like those of electric shocks, itching, weakness of the legs, excitement, palpitation. These disagreeable sensations, however, do not last more than a few minutes. The authors believe that these effects are due to the adrenaline, and that the hypophysis actually tends to lessen their severity.

A priore one might suppose that the use of these blood-pressure-raising agents would be contraindicated in high blood-pressure cases. This, however, is not the case, as the doses used, when given subcutaneously, have practically no effect upon the blood-pressure.

The authors do not seem to be able to give, to their own satisfaction, the reason for the beneficial results obtained. Inasmuch, they say, as the general effect of those substances is to produce contraction of the smooth muscles, it ought to do harm rather than good if asthma is due to bronchial spasm. They assume that reduction of the vascular turgescence by the hypophysis extract might partly explain the benefit; and reproduce a tracing (Fig. 6) showing that there is a fall in the pulmonary blood-pressure, a fact also brought out by Wiggers (1911), at the same time as there is a rise of pressure in the systemic circulation.

[The authors are apparently not aware of the fact that adrenaline does not cause contraction of all smooth muscles, but only of those constriction of which is produced by stimulation of the sympathetic nerves, while it causes relaxation of those muscles that are inhibited by the sympathetic nervous system. Most prominent among these are the intestinal and the bronchial muscles. —ED.]

TYRAMIN.

Tyramin in Circulatory Failure. A. W. Hewlett and W. E. Kay[10] have found that after the "subcutaneous injection of a full therapeutic dose of (from 60 to 80 mg.) of tyramin hydrochloride the systolic blood-pressure usually rises to levels of from 150 to 200 mm. The pressure begins to rise within five minutes after the injection, attains its maximum in about ten minutes, and subsides more gradually to its previous level, which is usually reached in from fifteen to thirty minutes. The diastolic pressure frequently rises also, but never to any great extent. The volume pulse in the arm becomes greater and more sustained. The heart rate becomes somewhat slower, and extrasystoles occasionally occur."

They next made observations on the effects produced by the subcutaneous injection of tyramin in the circulatory failure of infectious diseases as well as in that which may occur during or after operations.

In the circulatory failure which may complicate in-

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(10) Jour. Amer. Med. Ass'n., June 15, 1918.

fections, the subcutaneous injection of tyramin causes at times a transient rise of blood-pressure and an increase in the size of the pulse. These effects were neither marked nor constant. Furthermore, the drug was often ineffective shortly before the death of the patient. The effects of the drug were transitory; and, in their cases, the final outcome was not influenced. At the same time it is conceivable that under exceptional circumstances the temporary improvement in the circulation might prove of decisive value in enabling the patient to overcome the infection. In patients with circulatory failure during or after surgical operations, the injection of tyramin usually causes a transient but marked improvement in the pulse, the blood-pressure, and the general condition. The rise of pressure begins within five minutes and usually reaches its maximum in about ten minutes. While it can not be demonstrated that tyramin saved the life of any one of the patients whose cases are reported, the opinion prevailed among those who attended these patients that the outlook was unfavorable and that tyramin saved the life of one or more of them.

Even in those with normal circulation tyramin may cause extrasystoles, and when extrasystoles are already present it may increase their number. It is even possible that tyramin, like intravenous injections of epinephrin, may occasionally cause a fatal ventricular fibrillation, particularly in those whose heart muscle is in an unusually irritable condition. Hence it should not be administered when frequent extrasystoles are present. During chloroform anesthesia also the foregoing danger is increased.

Despite unfavorable experimental evidence, it seemed worth while to test the action of tyramin on paroxysms of asthma. In five patients, tyramin failed to abort asthmatic paroxysms, although other drugs (epinephrin and atropine) were subsequently used with benefit.

ALCOHOL.

Alcoholic "Stimulation" of no Value. In pneumonia of early infancy and childhood, H. Koplik[1] finds this

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(1) Jour. Amer. Med. Ass'n., Nov. 17, 1917.

true when comparing the results of a period of three years, in which alcohol in the form of whisky was freely given, with another similar period in which no whisky was used. Among 632 cases of pneumonia treated by the administration of medicinal doses of whisky—half teaspoonful to young children, teaspoonful to older children—there were 144 deaths, a mortality of 22.8 per cent. Among 719 patients treated without whisky, there were 104 deaths, a mortality of a little over 14 per cent. Hence the author feels certain that the whisky did not enable him to save life. Therefore he discarded it.

That no harm resulted from completely discarding the use of alcohol in the form of wine or brandy from hospital fare, even among the aged who have been accustomed to a life-long use of it is a testimony of G. Jona[2] on the basis of statistics from a Venetian hospital. He believes the educational effect from a suspension of alcohol has been most excellent and wide spread.

HYDROTHERAPY.

Hydrotherapy in Heart Disease. Hubert Schoonmaker[3] believes that in hydrotherapy there are more possibilities for good in the treatment of heart disease than in any other single agent excepting rest. It is important to differentiate between the different baths according to their temperature.

"A tub bath in the neutral zone (93° to 98° F.) without modification by chemicals is sedative to nervous, vascular and muscular systems. If prolonged, it is a cardiovascular depressant. It is, therefore, negative and possibly injurious in relation to heart disease, except in palpitation or the tachycardia of Graves' disease. General sedation here being indicated, a 10 to 20-minute full immersion bath in the neutral zone is often good treatment."

"A tub bath in the hot zone (98° to 110° F.), is actively stimulating to sensory and vasomotor nerves,

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(2) Policlinico, Nov. 11, 1917; abstr. Jour. Amer. Med. Ass'n., Jan. 26, 1918.
(3) Clifton Med. Bulletin, January, 1918.

induces quick flushing of the capillaries, a rise in temperature, increase in heart rate, perspiration and secondary cardiovascular degression. It is, therefore, contraindicated in the treatment of a weak heart.''

''A tub bath in the cold zone (below 93° F.) produces stimulation of the sensory nerve ends, contraction of muscle fibers of skin and capillaries, secondary stimulation of vasomotor nerves with relaxation of muscle fibers of skin and capillaries, flushing of capillaries, contraction of deep arterioles with elevation of blood-pressure. Furthermore it excites inspiration and expiration, thus lessening the burden of the left heart. Thus a cold zone bath provides a mild gymnastic treatment for the heart in a field relatively free from peripheral resistance, because of capillary dilation, and from the embarrassments of voluntary muscles in action (the patient being fully relaxed during the period of treatment).

If the cardiovascular system responds in the desired manner to the cold bath, the clinical evidence is a showing of the pulse, an increase in the pulse volume, an increase in the volume of the first heart sound, a shortening of the diameters of the heart and a sense of well-being on the part of the patient. The degree of cardiovascular response is in direct ratio to the coldness of the bath, but reactive capacity of the individual must also be taken into account; and this makes each case as a law unto itself. It is here that the Nauheim system is of value, whose essentials are; a stimulating bath in water containing varying amounts of salts, the chief of which are sodium chloride and calcium chloride, and carbon dioxide. The salts act as skin irritants and thus encourage capillary dilatation, as do all skin irritants. The gas is also a skin irritant and at the same time a conserver of body heat by virtue of the layer of globules which forms upon the skin. It is a non-conductor. This combination of flushed capillaries and slow heat radiation makes comfortable a cold bath, providing there has been in relation to the individual a proper graduation of temperature and time. It is the rule to begin a course of baths, numbering 18 to 20, at about 94° F., seven minutes' duration, and to diminish the temperature 1 degree, and increase the time one minute every second or third bath until 86° and 16 minutes are reached. At the same time the saline and gas contents are gradually increased; the strength and duration of the bath thus keeping pace with the down curve of its temperature. During the bath the patient should be fully relaxed so that the heart be not embarrassed by contraction of voluntary muscles, and care should be taken not to rub the gas from the skin. The skin should redden perceptibly, and there should be no chilliness except possibly upon entering or leaving the tub. The latter is combated by quickly wrapping the patient in a hot sheet which is at hand, drying by patting and rubbing, and, further, by a second hot sheet. The patient is then comfortably covered on a couch or in bed and instructed to rest for at least one hour. Slow reaction may be anticipated by a hot drink before entering the tub. These are general rules, subject to various modifications. One can scarcely think of a more flexible therapy. Such baths are indicated in any case of myocardial insufficiency (weak heart), from any cause, provided the skin capillaries react to stimuli and the reserve force of the heart be not lost. Indications may be best defined by discussion of contraindications. In advanced valvular disease with complete loss of myocardial reserve, hydrotherapy is contraindicated until compensation has been partially restored. Hydrotherapy may be prescribed once the cardiovascular forces are in the ascendency. In acute dilation of the heart from physical overstrain the same is true. In advanced infectious myocarditis, advanced fatty heart and the terminal stage of cardiorenal disease, hydrotherapy is contraindicated. In another smaller group, failure of skin capillaries to respond to stimuli fixes the contraindication. This applies to general arteriosclerosis with pronounced obliteration of capillaries and to mitral stenosis with typical secondary heart changes. In typical mitral stenosis the left ventricle is small and weak. Consequently with each heart systole the amount of blood forced into the arterial tree is relatively small and the total fluid on the arterial side is always small. Therefore, flushing of the capillaries sufficient for the needs of a prolonged cold bath is quite impossible. It is obvious then that the Nauheim bath in the cold zone is contraindicated in advanced arteriosclerosis and in typical mitral stenosis.

Failing kidneys and sclerotic arteries do not react well to cold. On the other hand, a failing heart does not react well to heat, that is, to a hot bath sufficient in temperature and time to induce sweating which may be indicated because of kidney insufficiency. So it is that in myocarditis, secondary to nephritis and arteriosclerosis, the prescription should be a compromise, namely, a saline or saline carbonated bath in the neutral zone, 93° to 98°, 8 to 15 minutes in duration. If the saline content be heavy, skin response will be good, resulting in improved kidney function, reduction in toxemia and secondary improvement in cardiovascular tone. Obviously, the physiologic response to cold will be lacking.

The hydrotherapy of angina pectoris is that of the underlying condition. If this be coronary or general arteriosclerosis, the warm baths, just described, are indicated. If it be a dilated heart, in the absence of sclerosis of the vessels or of kidney disease, then the graduated cold baths are indicated. Hydrotherapy is as safe a remedy in angina pectoris as any potent drug and more efficacious. The author desires to emphasize this point because it has been said, and is commonly believed, that hydrotherapy is contraindicated in angina pectoris.

The "Nauheim Baths" in Angina Pectoris. Leslie Thorne[4] believes that there are very few cases of angina pectoris which will not derive benefit from a course of properly administered "Nauheim" baths, and he has found in several instances in which the treatment by drugs, rest and dietary measures produced little improvement, that a course of baths has either abolished attacks for a long period, or rendered them less frequent and less severe. He warns, however, that the administration of baths should never be left entirely to an attendant or nurse, however skilled that attendant may be, for it is only by carefully watching the effect upon the heart and circulation in each individual case that

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(4) Practitioner, August, 1917.

those which produce the best results can be given, and a bath which is suitable for one case is quite unsuitable for another. Hence effect upon the volume, rate, and regularity of the pulse must be carefully noted during immersion at least twice a week. It is important that the patient be able to get straight out of bed into the bath and back from bath to bed, for the necessary hour's rest, without involving the exertion required in the undressing and dressing which is unavoidable if he does not reside on the spot where the baths are given.

The dilatation of all the cutaneous capillaries produced by immersion in a "Nauheim" bath may be likened somewhat to the effect of the inhalation of amyl nitrite, with these differences: the capillary dilatation is slower and more general, does not produce any unpleasant sensation of fullness or headache, and is very much more lasting than that of the drug. This dilatation causes a fall of blood-pressure [whether rise or fall depends upon the temperature of the baths.—ED.] and relieves any condition of contractile spasm present in the vessels, thereby lessening the resistance to be overcome by cardiac contractions, so that the heart is enabled to do its work quite satisfactorily with a decidedly slower beat than was required before immersion; and, consequently, a sedative and anti-spasmodic condition of the circulation is established. The author never treated a case of angina which has not shown material and steady improvement both during the course as well as for some months after it.

[The technique of the carbonated bath in the home, is on the whole, quite simple. For a strong bath, two pounds of sodium bicarbonate and one and a half pints of commercial muriatic acid are used. At the first bath, however, only one-fourth of this quantity is used; and, as the temperature of the bath is lowered, the quantity of the effervescing ingredients is progressively increased. It probably is of no very great importance whether the 1, 2, or 3 per cent. of salt are added in more exact imitation of the Nauheim bath or not. The sodium bicarbonate is dissolved first in the bath water; and, just before the patient enters the bath, the acid preferably diluted with an equal quantity of water is discharged underneath the surface of the water from an inverted bottle or an irrigator.

The temperature of the first bath should be 95 to 90° F. If this is well tolerated, the temperature is gradually reduced to 80, and even to 75° F., excepting in arteriosclerotic or in nephritic cases in which it is well not to go below 85° F.

The duration of the bath is at first five minutes; at subsequent baths it may be increased to seven, ten, fifteen, then twenty minutes. The bathroom should be well ventilated, and not warmer than 65° F.—Ed.]

VASO DILATORS.

Nitrites Are Among the Most Valuable Remedies in Angina Pectoric says the late E. Fletcher Ingals[5] who suffered himself from this malady.

"They are commonly given in insufficient doses. X found the most satisfactory preparation a hypodermic tablet of nitroglycerine of 1/100 grain, which was found to act more promptly and effectively than otherwise, when allowed to dissolve on or beneath the tongue. In this way its full effects were experienced in from one to three minutes, whereas, if it had been taken into the stomach, only about half the efficiency was experienced, and it did not appear for about ten minutes. Frequently two or more of these tablets were taken at once, and they were repeated every few minutes until the desired effect was obtained. Often as many as ten or a dozen were taken in two or three hours. As much as 15 to 20 hundredths of a grain three times a day has been recommended in severe cases. A physician told me of one patient who took 100 of the 1/100 grain nitroglycerine tablets in one day with the effect of relieving a severe angina, and at that time he said the pain had not returned for three years. X usually took four or five of the tablets daily; and, when the pain was worse or more persistent, ten or twelve. Frequently after these larger doses he would be entirely free from pain all the next day."

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(5) Jour. Amer. Med. Ass'n., April 6, 1918.

"From my personal observations," says Ingals, "I think these large doses are often needed; and, if the physician feels his way with gradually increasing doses, no harm will come from them unless they cause too much headache. Osler thinks nitroglycerine is too timidly used and is then abandoned as ineffective. The preparation should be reasonably fresh, and prescribed in the original package. It may be carried in a small closely stoppered bottle to prevent evaporation, and renewed from the original package every week or two. The patient should be warned of the possible dizziness, the flushing of the face, and the headache resulting from its use; and should be assured that these disorders will do no harm. I have found it a good plan to give the patient 1/100 grain or more at once, so as to learn its effects before he leaves my office. After the susceptibility has been determined, it is best to give a full dose when attacks come on. It may be repeated as often as necessary to accomplish the result, except when it causes too much headache. The headache is sometimes relieved by repeating the dose. This remedy does no harm even from prolonged use. It is of doubtful utility when given only three times a day in the conventional dose of 1/100 grain."

"X did not like amyl nitrite because of its odor, and also because during an attack he found it difficult to dispose of the glass. It is asserted that although this remedy acts quickly, it is not as certain as nitroglycerine. The few times that X used it, its effects were practically *nil.*"

"Sodium nitrite disturbed his stomach, by the time two or three doses had been taken. This drug seems to have some toxic property. Erythrol tetranitrate caused more headache and did not relieve the pain as promptly as the nitroglycerine, although some patients have found it more satisfactory because of longer duration of its effects."

Acetyl-Cholin a Vasodilator. Reid Hunt(6) summarizes a research on vasodilator reactions as follows: "Acetyl-cholin has an intense vasodilator action on the vessels of the skin and of the ear; the action on the skeletal muscles is slight. It dilates the vessels of the penis, of the submaxillary gland and of the spleen; it seems also to dilate the vessels of the intestines and liver. Only slight evidence of a dilator action was found in the case of the kidney and none in that of the lung. The nasal mucosa seemed relatively less sensitive to the vasodilator action of acetyl-cholin than many other vascular areas. The vasodilation in all of these cases was diminished or prevented by atropine. As little as 0.000,000,002,4 mg. aceytl-cholin per kg., caused a pronounced fall of the blood-pressure. Acetyl-cholin injected into the trachea or applied to the surface of the lung, kidney, liver, adrenal and various muscles was very active in causing a fall of blood-pressure; similar doses applied to the surface of the stomach, spleen and small intestine had no effect on the blood-pressure."

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(6) Amer. Jour. Physiol., February, 1918.

RESPIRATORY STIMULANTS.

Cyanide as Respiratory Stimulant. A. S. Loevenhart, W. F. Lorenz, H. G. Martin, and J. Y. Malone[7] suggest the slow intravenous injection of 0.1 per cent. sodium cyanide solution as a most potent means of stimulating the respiratory center in such conditions as resuscitation from drowning, respiratory embarrassment in anesthesia, respiratory depression of intracranial pressure until decompression can be accomplished, and as an aid to artificial respiration in other emergencies. The effect is noted within twenty seconds and may be controlled by the rate of injection. If the injection is too rapid, the following warning symptoms show themselves; pallor, nausea, increase of pulse rate and depression rather than stimulation of respiration. They believe that the margin of safety is sufficiently large for clinical purposes.

Effect of Alcohol Upon the Respiratory Center. That the question whether alcohol is essentially a depressant of all bodily functions, as claimed by Schmiedeberg, or primarily a stimulant, as claimed by Bintz, is by no

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(7) Arch. Int. Med., January, 1918.

means settled, is shown by recent work upon this question. D. R. Hooker,[8] perfusing defibrinated dog's blood through the common carotid artery of the dog under such conditions of vessel ligature that the perfusate is practically isolated to the head region, found that the addition of ethyl alcohol to the extent of 0.025 per cent. stimulates respiration. An increase to 0.1 per cent. produces a greater response, while 0.2 per cent. causes a transitory stimulation followed by prolonged inhibition. Inasmuch as the concentration of alcohol in the human blood may reach as high as 0.2 per cent., as was found in a comatose individual, these findings might be applied to the human; and the increase in pulmonary ventilation occurring on the administration of alcohol to human beings may have to be ascribed to a direct action on the respiratory center, rather than to increased metabolism and heat production as was assumed on the hypothesis that alcohol was a primary depressant to nervous tissue.

GASTRO-INTESTINAL REMEDIES.

Liquid Petrolatum in the Treatment of Gastric Affections. Heinrich Stern[9] claims that liquid petrolatum may be utilized for exactly the same purposes as olive oil in the symptomatic relief of various diseases and disorders of the stomach, such as hyperchlorhydria, excessive acidity due to organic acids, pylorospasm and gastroduodenal ulcer. The dose of the liquid petrolatum in the amelioration of gastric disturbances should be a rather large one. Two or three tablespoonfuls should be administered as a rule; according to the case it should be given either before or after meals and, if necessary, at bedtime. In hyperchlorhydria it is best to prescribe the mineral oil to be taken from fifteen to thirty minutes after meals. There are cases of acidity in which it is best to exhibit a tablespoonful of the oil before as well as after taking food. In pylorospasm and probably also in cardiospasm, the affected parts should be bathed in mineral oil for as long a period as possible.

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(8) Jour. Pharm. and Exp. Ther., August, 1917.
(9) Amer. Medicine, August, 1917.

In these cases the author found the most practical benefit by administering the oil in very small and very frequent doses on the critical days. In ulcer of the stomach or duodenum the mineral oil should be given in broken doses before, during, and after meals. Limit of the doses is dictated by the laxative effect.

Some Practical Points on Carminatives are given by George M. Niles.[10] One of his favorite carminative formulas is the following:

		gm. or c.c.
℞	Tr. cardamomi comp..................	8.00
	Zinci sulphocarb......................	2.00
	Magmae magnesiae....................	90.00
	Aquae, q. s. ad..........................	120.00

M. Sig.—1 teaspoonful after meals and repeat as needed for gas.

When this prescription is used up, there can be substituted in the next comp. spir. of lavender, spir. of anise, spir. of fennel, etc. When there is a tendency to nausea, the spir. of bitter almond is most grateful to the patient, but it should not be given in doses of more than three or four minims. If the bowels are inclined to diarrhea, the milk of bismuth may be used instead of the milk of magnesia.

In the presence of marked atony of either the stomach or intestines, the hypodermic administration of pituitrin, preferably obtained in ampules, will prove serviceable.

"In those aërophagics whose frantic efforts are defeated by a fresh gulp of air with each eructation, the treatment needs to be medicinal, psychic and educational. The real nature of their infirmity should be explained, together with the necessity for mental quietude during the paroxysms. In some instances, if a rubber eraser is held between the teeth so that neither they nor the lips can be brought into close apposition, the eructations soon cease for the want of atmospheric ammunition. If liberal and frequent doses of either milk of asafetida or elixir of the valerianate of ammonia are imbibed, an early improvement may be confidently anticipated." These carminatives are indeed invaluable whenever patients belch more than

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(10) Southern Med. Jour., June, 1918.

necessary, their vile taste and odor being a potent aid to their actual therapeutic effect.

Burdock Root in Hepatic Colic. E. Savini[1] on the basis of the popular belief existing in Roumania that burdock root is of value in diseases of the liver, employed the fluidextract of burdock root (Fluidextractum Lappae, U. S. P.) in dose of from 4 to 6 teaspoonfuls a day with surprisingly good results in seven consecutive cases of hepatic colic. The effects of this treatment showed themselves in a well-defined diuresis, in improvement of the appetite, and above all in the disappearance of the attacks, which do not recur even during such critical periods as those of menstruation. He has also noticed that it is capable of diminishing jaundice and reducing the size of the liver. The author is unable to give experimental data in explanation of the facts stated. He believes that the glucoside lappin is probably the active principle and that it must possess cholagogue and antispasmodic properties.

The author made the interesting observation that patients suffering from cholelithiasis are much more likely to display tenderness in the gall-bladder region when they are examined in the standing posture than in the dorsal decubitus. This is likely to be a point of considerable diagnostic importance.

Evacuant Treatment. Cary Eggleston[2] recommends a simple glass rod suitably bent and rounded as the simplest means for the training of infants to have regular movements of the bowels. The use of suppositories is objectionable owing to their expense and the possibility of irritating the delicate mucous membrane through their hygroscropic properties, when they have to be employed very frequently. The clinical thermometer is expensive; it is delicate and very likely to be broken, possibly within the anus; and, being straight, it is clumsy when the infant is made to sit upon a chair or chamber.

The appearance of the rod is shown in the accompanying illustration (Fig. 7). The dimensions are:

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(1) Arch. des mal. de l'app. digestif et de la nutr., Nov. 8, 1917.
(2) Jour. Amer. Med. Ass'n., Jan. 19, 1918.

diameter, 5 mm.; length of short arm, 3 cm.; length of long arm, or handle, 7 cm.

"Preparatory to use, a small amount of plain petrolatum (liquid or solid) is applied to the short arm of the instrument as a lubricant, and this is then inserted into the anus to near the bend. When the infant is in the sitting position, the bend permits the rod to be inserted and held without striking the sides of the vessel."

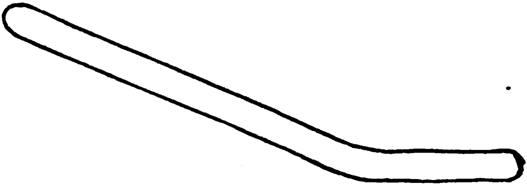

Fig. 7.

Liquid Agar-Agar in Constipation. Orville Harry Brown and William Oscar Sweek[3] believe that a sufficient amount of liquid agar taken with enough water softens the feces more efficaciously than when the same amount is taken dry. Insomuch as the taste of the liquid agar is slightly flat and insipid with perhaps a little suggestion of mustiness, it must be prepared so palatably that the patient will willingly take it in sufficient quantity, frequency and duration. Hence the following directions are ordinarily given: "Take 2 heaping tablespoonfuls of the agar powder, flakes or shreds; add to 1 quart of water and boil till the agar is thoroughly liquefied; sweeten and add the juice of one lemon; then drink the entire quart while hot. As a quart is a considerable quantity of liquid for some persons to consume in the course of a few minutes and heating the agar over or preparing smaller amounts several times a day is a laborious task, the quart of hot agar can be prepared in the morning, poured into the vacuum bottle, and taken leisurely during the day. The material is most efficacious when taken between meals. To meet the various idiosyncrasies regarding taste, pa-

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(3) Jour. Amer. Med. Ass'n., Aug. 11, 1917.

tients may make use of orange, grapefruit, vanilla, maple or other flavoring in place of lemon. A coffee, chocolate or tea may be prepared and be most pleasant. Again, a bouillon agar may please. It may be taken cooked with a cereal; this should not be allowed to cool before it is eaten. The liquid agar will not have its beneficial effect usually until used several days. Commonly, however, some good will be apparent within a week if a quart of hot agar is taken daily. Later the dose may be reduced. In some cases it must be increased. In some it fails.

NERVE SEDATIVES.

General Anesthetics.

General Analgesia by Oral Administration. James T. Gwathmey and Howard T. Karsner[4] have undertaken a study of the feasibility of inducing general analgesia, *i. e.,* loss of sensation without loss of consciousness, a state that would be useful for otherwise painful dressings and for short operations. The following combination was found useful:

Ether	16.0 ml.
Liquid petrolatum	16.0 ml.
Peppermint water [? oil—Ed.]	0.3 ml.

The mixture, being somewhat disagreeable to the taste and smell, is probably best taken in the following manner: An ounce of port wine is placed in one glass and the analgesic in another glass. The patient takes a mouthful of wine, holds it for about thirty seconds, rinsing the mouth so as to get the aroma in the upper air passages and the taste well established, and then swallows the wine. The ether mixture is then taken and is followed immediately by the remainder of the wine. Several wines and liquors were tried, but port wine was found to be the most satisfactory. Numerous patients have been given it with excellent results. Only one patient has been nauseated, a man who was vio-

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(4) Jour. Amer. Med. Ass'n., April 6, 1918.

lently opposed to taking the wine. The addition of paraldehyde served no useful purpose. The addition of chloroform, on the other hand, has been found to make even a more satisfactory mixture than the above. The following formula has been used in approximately thirty cases:

Chloroform	2 to 4 ml.
Ether	14 ml.
Liquid petrolatum	14 ml.

As the rate of evaporation from minute to minute is constant, it is impossible for the patient to get an overdose at one time and an insufficient amount at another time. The total amount is not absorbed at one time; if it were, the administration of 60 ml. of 50 per cent. ether in oil would produce complete anesthesia. However, only a light analgesia is obtained which, for operative purposes, must usually be supplemented in some way. As the patient in the analgesic stage is separated from the danger zone by the period of anesthesia, the authors believe analgesia by this method to be safer than any method of anesthesia. [It seems that this method might have therapeutic possibilities in medical practice also.—Ed.]

Chloroform Analgesia by Self Inhalation for Dressing of Wounds. Torald Sollmann[5] believes that a brief and harmless, but adequate, analgesia could best be secured by the inhalation method, which introduces and eliminates the narcotic rapidly. "Self inhalation" carries with it an automatic safety device, in that the patient will be unable to continue the administration beyond the point at which consciousness is lost. Chloroform was more effective than any of the other anesthetics that were tried. Hence the author would advise the clinical trial of the chloroform, in the following manner: "Five c.c. of chloroform are measured, soaked up in cotton, and given to the patient, to be applied by him in the palm of his hand directly to the nose, his hand excluding the air as much as possible. The patient should be directed to hold the sponge to the

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(5) Jour. Amer. Med. Ass'n., Aug. 24, 1918.

nose until the operation is completed. He should be instructed to breathe quietly and deeply. The dressing procedures can be begun between three and five minutes after starting the administration, and timed so as to be completed within twenty minutes." The dose should be measured accurately and not exceeded. Repetition of the dose at the same sitting is to be avoided; but, if absolutely necessary, the same dose may be given at the end of fifteen or twenty minutes on a fresh piece of cotton. It must be remembered that the chloroform used in this way does not usually produce unconsciousness. The object of the chloroform in that dosage is to produce a drowsy apathy, in which the patient in the first place feels the pain less, and in the second place is more indifferent whether he feels it or not.

The Acidosis of Anesthesia. This, according to Evarts A. Graham,[6] is not only due to asphyxial products of acid nature, but also, in case of chloroform, to the fact that each molecule is capable of yielding three molecules of hydrochloric acid, if the decomposition were complete. He cites a number of facts to prove that such decomposition actually does occur in the body. Of therapeutic importance is the fact that alkali, when given to dogs in suitable concentrations simultaneously with chloroform, inhibits to a marked degree the production of the typical lesions by chloroform.

"Iodoform (CHI_3) and bromoform ($CHBr_3$), which are similar in chemical structure to chloroform ($CHCl_3$), likewise produce lesions which are indistinguishable from those of chloroform. In their cases, however, hydriodic and hydrobromic acids, respectively, are formed instead of hydrochloric."

The reason for the protective action of glycogen in connection with those intoxications that are associated with an acidosis, Graham believes to be due to the fact that glucose markedly inhibits the diffusion of acids through gels.

The author points out, however, that there are other toxic dissociation products of these substances besides acids. It is highly probable that, in a manner analogous to cyanides and carbon monoxide, the toxic properties

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6) Jour. Amer. Med. Ass'n., Nov. 17, 1917.

of many of the anesthetic substances are partly due to the bivalent, or unsaturated carbon residue.

LOCAL ANESTHETICS.

The Comparative Efficiency of Local Anesthetics. This has been investigated by Torald Sollmann.[7] The author confirmed the observation of O. Gros that the addition of alkali increases very noticeably the efficiency of cocaine and of the synthetic anesthetics for anesthesia of the mucous membranes, doubtless because the free anesthetic bases penetrate more readily than the salts. On the other hand, no potentiation occurred on intracutaneous injection, evidently because this does not require penetration. Hence the addition of sodium bicarbonate serves no useful purpose for infiltration anesthesia. It may be of some use for intraneural and possibly for subdural injections, and it would be definitely useful for surface anesthesia. As these mixtures do not keep well they should be freshly prepared. The anesthetic should be made up in double concentration, and diluted, just before use, with an equal volume of 0.5 per cent. sodium bicarbonate solution. This increases the efficiency for the cornea from two to four times.

Epinephrine, introduced mainly by H. Braun to prolong the local anesthetic action for infiltration and injection anesthesia, is notably effective for this purpose. With intracutaneous injection, the anesthesia is prolonged for hours. Tropacocain is an exception, since this destroys the vasoconstrictor action of epinephrine. The epinephrine acts solely by preventing the absorptive removal of the drugs. In practice, this means that the anesthesia can be maintained for the duration of an operation with much less drug, thus diminishing the chances of systemic toxicity, and obviating waste of anesthetic. The addition of epinephrine (about 1:50,000) is therefore advised for all injection anesthesias (except tropacocaine.) On the other hand, epinephrine is quite useless for surface anesthesia; indeed, it rather diminishes the penetration and therefore the efficiency of the anesthetics on mucous membranes (cornea). The

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(7) Jour. Amer. Med. Ass'n., Jan. 26, 1918.

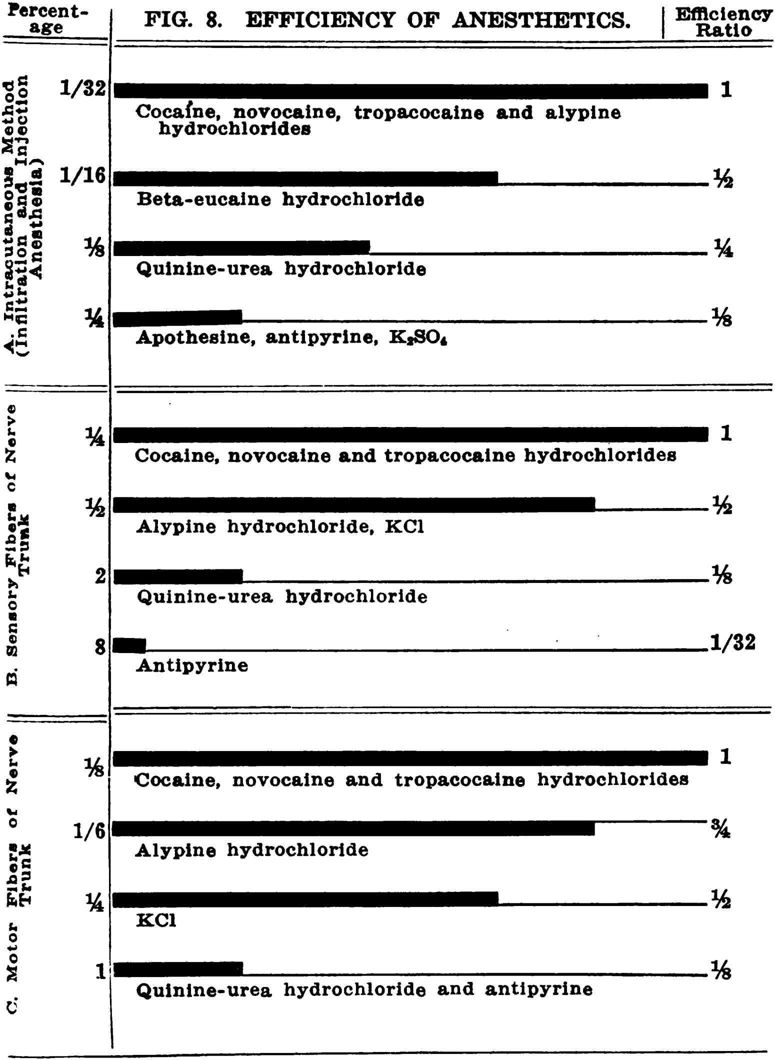

Fig. 8. Efficiency of anesthetics in surface anesthesia.

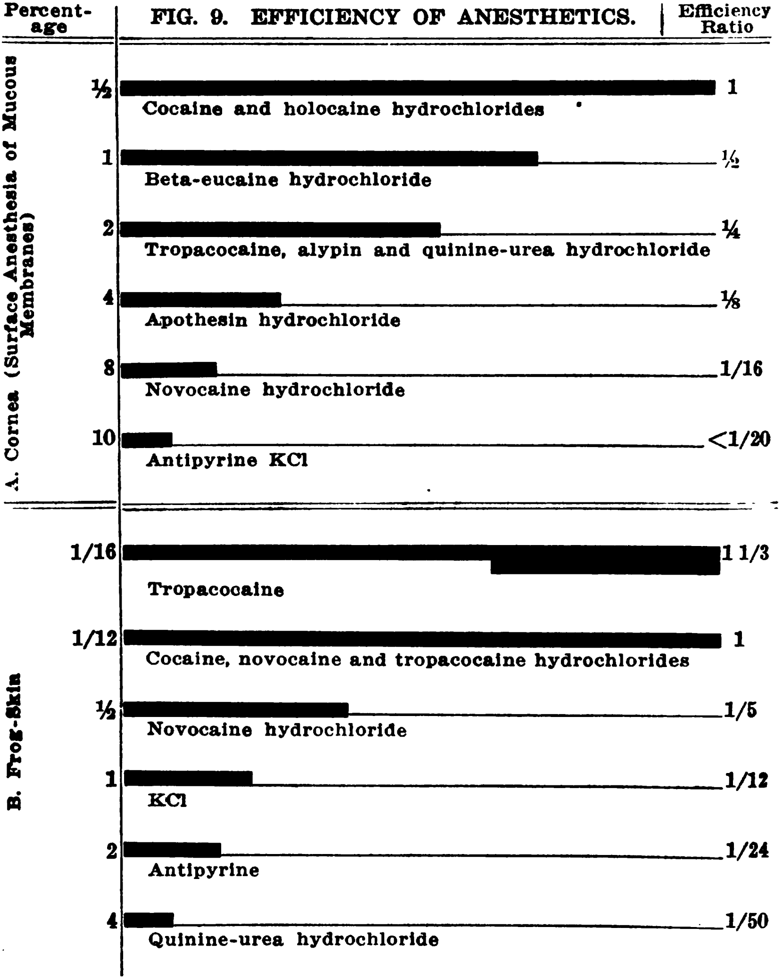

Fig. 9. Efficiency of anesthetics in injection anesthesias.

author also doubts whether it would be of service in intraneural or subdural injections.

Combinations of anesthetics is of little or no advantage except, perhaps, in mixing any of the synthetic anesthetics with quinine urea, or with potassium chloride: these are rather too feeble by themselves; but when they are used in non-irritant concentrations, being employed to take the place of a part of the synthetic anesthetics, the toxicity of the latter is correspondingly reduced. A 1 per cent. (that is, isotonic solution) of potassium sulphate or chloride may well be used in place of sodium chloride for making anesthetic solutions.

The author concludes as follows: "For the anesthesia of mucous membranes, the relative efficiency is shown in Fig. 8A. The numbers at the left show the percentages needed to equal 0.5 per cent. cocaine hydrochoride. Cocaine, beta-eucaine, alypine and tropacocaine are the most useful; quinine-urea hydrochloride is fairly active. Apothesine, novocaine and potassium chloride are relatively inefficient. Alkalization increases the efficiency from two to four times. On the other hand, the addition of epinephrine does not increase the efficiency, and is probably useless.

"For infiltration and injection anesthesia, and relative efficiency is shown in Figure 9A. Cocaine, novocaine, tropacocaine and alypine are about equally efficient. Beta-eucaine and quinine-urea hydrochloride are intermediate; apothesine and potassium sulphate (or chloride) are relatively inefficient. The efficiency is not increased by alkalization. Epinephrine greatly prolongs the action, and should always be added (except to tropacocaine)."

NERVE BLOCKING.

Nerve Blocking in the Treatment of Painful Dysphagia of Tuberculous Laryngitis is urged by Robert McD. Lukens.[8] This procedure, originated by Hoffman in 1908, is practiced as follows: Thorough asepsis should be used throughout as regards the operator's hands. instruments, and skin of neck. The hypodermic syringe

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(8) New York Med. Jour., Feb. 23, 1918.

should be provided with a one and one-half inch twenty-four gauge needle with a sharp point. Lukens uses essentially a 65 per cent. solution of alcohol of the following composition:

Novocaine	0.12 gm.
Chloroform	0.60 ml.
Alcohol	24.00 ml.
Water	8.00 ml.

"The patient should be either lying supine with the head, neck, and shoulder raised on a pillow and the head turned to one side, or sitting upright in a chair with a comfortable back. The greater cornu of the hyoid bone and the superior cornu of the thyroid cartilage is located with the index finger of the left hand and the loaded syringe held in the right hand. The needle is then thrust through the skin about one inch anterior to the directing finger and a quarter inch above the margin of the thyroid cartilage and pushed backward and inward, the point being raised from time to time to locate its position by the directing finger tip of the left hand. The patient gives the signal of pain in the ear by raising his hand. When the nerve has been touched, a drop or two of solution is injected; and a few seconds are allowed to pass to see if there is cough due to the fluid entering the lumen of the larynx. If a cough develops, the syringe is withdrawn a little and a few more drops are injected. If no cough is present, then 0.5 to one ml. of the solution is injected, moving the needle around so as to surround the nerve thoroughly. Usually the pain in the ear is intensified by the discharge of the fluid into the tissues about the nerve, but passes off in a few seconds. One or both sides may be injected at one sitting. If injection of one side does not wholly relieve the pain the other side is injected at the same time. If the pain is not then relieved the nerves are injected at intervals of three to five days. Only one of 19 cases showed no benefit after one or more injections; and, in this case, the lesion of the larynx was very slight. It is possible that the dysphagia was due to an extralaryngeal process." Lukens always has the patient try to drink water before and immediately after the injection and note the difference. The shortest period of relief from one injection was three days and the longest forty-two days. The shortest total number of days of relief from more than one injection was six days and the longest 105 days. By relief of pain the author means relief of any discomfort whatever. The author concludes that in all cases of painful dysphagia the internal laryngeal nerve should be blocked. There are no contraindications to nerve blocking; and this procedure aids the dietetic treatment by removing or lessening dysphagia sufficiently to allow the patient to eat necessary food. Any number of injections may be made; and the patient kept in constant comfort by injecting as soon as the pain recurs. A wider use of this method of treating painful dysphagia in tuberculous ulceration of the larynx might certainly be urged, as it is a procedure which can be learned easily and practiced by the average practitioner.

Injection Treatment of Sciatica. Israel Strauss,(9) on the basis of experience with 91 cases, finds the treatment of sciatica by injection of sodium chloride solution, whether epidurally or in the neighborhood of the nerve, a means of shortening the duration of this painful malady from weeks and months to days.

In making an injection of physiologic sodium chloride solution into the neighborhood of the nerve according to the technique of Lange, "the patient lies on the abdomen with a pillow underneath its lower part, and the feet projecting beyond the edge of the table or couch. A line is then drawn from the sacrococcygeal articulation to the lowest point of the postero-external border of the great trochanter. The point of puncture is 1 inch to the outer side of the junction of the inner one-third and outer two-thirds of the foregoing lines. A trocar and cannula about 20 cm. in length and 2 mm. in caliber is used in the injection. The point of the trocar ought not to project very far beyond the cannula. The needle is inserted directly downward through the gluteal muscles until the nerve is reached. When the nerve is touched, the patient feels a sharp, shooting pain down the leg, and there is very often involuntary contraction of the gastrocnemius muscles. When the nerve is struck the trocar is immediately withdrawn, and a syringe attached to the cannula. Physiologic sodium chloride solution is then injected in amounts varying from 100 to 150 ml. Considerable pressure is sometimes necessary in order to force the fluid into the tissues; and, in such cases, care must be taken that the needle is not forced into the nerve. Considerable pain may follow the injection, which, as a rule, subsides after an hour. It may be necessary to repeat the injection every other day until at least five are given, but as a rule three injections suffice. Alcohol should never be used for these injections."

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(9) Jour. Amer. Med. Ass'n., Dec. 15, 1917.

Epidural injection, described by Cathelin, is made through the foramen sacrale superior. This lies at the end of the crest made by the spines of the sacrum. It is bordered laterally by two prominences, the cristae sacrales laterales, which are usually easily felt by the finger. The opening is covered by a dense fibrous ligament, the ligamentum sacrococcygeum. The opening lies generally 2 cm. above the end of the gluteal fold. The needle used for the injection should be about 8 cm. in length, and 1 mm. in caliber. After the needle has been pushed through the skin, considerable resistance is met at the ligament. Once this resistance is overcome, the needle glides into the epidural space. It is to be inserted to a depth of 6 cm. to reach the second sacral vertebra. To be certain that the subarachnoid space has not been entered, it is well to wait for a few minutes before injecting to see whether there is an escape of cerebrospinal fluid. If possible, when inserting the needle, one should place the patient in the knee-chest position in order more easily to locate the landmarks. During the injection the patient lies on the affected side. The injection consists of warm sterile physiologic sodium chloride solution. To the first 10 or 20 ml. of solution is added 0.125 gm. of novocaine with epinephrine, and a few minutes are allowed to elapse after their injection to obtain the full benefit of their anesthetic effect. In all, from 60 to 80 ml. of solution are injected at a time. The injections are given at forty-eight-hour intervals. They may be given in the office, and the patient will have no difficulty in going home. It is preferable, however, for the patient to remain in bed during the intervals. The average number of injections required is three. The patient may improve after several epidural injections but not be entirely cured. The injections of sodium chloride solution along the course of the nerve in the gluteal region may then cause the disappearance of the pain.

MORPHINE.

Local Analgesic Action of Morphine. It is generally assumed that morphine possesses no local anesthetic action. Some experiments reported by Macht (1916) throw doubt upon this theory. T. Sollmann,[10] in a study on local urticaria, finds that morphine, which is capable of producing well-marked wheals when applied to the abraded skin in dilutions of 1-1000 and 1-2000 causes at the same time a diminution in the sensitiveness of the affected area. Sollmann was at first inclined to refer this to the edema. That this is not the explanation, however, he found by showing that wheals produced by histamine, a most powerful urticarigenic agent, acting in dilutions up to 1-100,000, were not anesthetic. Of course, this has nothing to do with the ordinary morphine analgesia, for it requires a fairly high concentration of morphine and is not complete even then. [It might, however, show the advantage of adding morphine to the cocaine solution, as was advocated by Schleich in his infiltration anesthesia, a practice which was combated on the ground that morphine had no local effect.—ED.]

Morphine-Tyramine Analgesia in Labor. The employment of tyramine in effective doses as an adjunct to morphine to produce analgesia in labor is suggested by H. G. Barbour[1] on the basis of pharmacologic investigation. The aim of the investigation was to devise means of antagonizing the two undesirable influences of morphine when used for this purpose, namely, respira-

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(10) Jour. Pharm. and Exp. Ther., August, 1917.
(1) Jour. Amer. Med. Ass'n., Sept. 15, 1917.

tory depression in the child, and delay of labor. That scopalamine does not possess these powers of antagonism is fairly well known; and this is why the administration of scopalamine and morphine analgesia is limited to-day to those who possess "a combination of unusual facilities and almost superhuman patience."

The value of tyramine, one of the active principles of ergot, for this purpose was first suggested by Bry (1914), who pointed out that tyramine stimulated respiration while at the same time it possessed oxytocic action, as shown by Dale and Dixon (1909). Barbour and his associates found that tyramine did not antagonize the morphine narcosis in mice, that tyramine, especially when combined in a ration of three to one of morphine, completely antagonized the depression of the respiratory center, not only in animals but also in man. The action of tyramine upon the uterus seemed too well established to require further investigation.

Barbour states that the hypodermic administration of 16 mg. of morphine sulphate and 40 mg. of tyramine has been undertaken in a number of cases of labor. The injection is given when discomfort becomes marked in the first stage of labor. Analgesia seemed to be as complete as though the same dose were given alone. The respiratory rate of the mother becomes increased rather than decreased, and the condition of the children has been quite satisfactory, no tendency to asphyxia having been observed. In every case the frequency of the uterine contraction became increased within five minutes after the injection. The increase has usually been from five minute intervals to intervals of about two minutes. There has also been at least a temporary increase in the strength of uterine contractions. A temporary rise of blood-pressure, usually amounting to 20 to 25 millimeters, has also been observed in these cases.

The author concludes that there can be no objection to the employment of tyramine and morphine by those obstreticians, and only those, who are thoroughly versed in the use of morphine in labor.

[The combination of morphine with tyramine might also prove of value as a surgical anesthetic, for the improved respiratory activity would certainly be an advantage, while unless the patient be preganant the action upon the uterus would be of no importance. On the other hand, the power of raising blood-pressure might be of advantage in the antagonizing of shock.—ED.]

Use of Morphine in Peritonitis. R. J. Behan[2] would reserve the administration of morphine for certain definite conditions that are present in the course of a peritonitis. In every instance, if the patient is seen at the very beginning of the disease, morphine should be exhibited in order to inhibit peristalsis, so that the quiescent intestine may offer more opportunity for the formation of protective and life-saving adhesions. If the intestine is quiet, as is determined by the absence of peristalsis when the abdomen is auscultated, morphine no longer should be given. The danger now is that the paralysis may ensue and become permanent, leading to great distinction and angulation of the bowel. To counteract the occurrence of this most disagreeable complication it is necessary to give some intestinal muscle excito-contractor, such as pituitrin or eserine. Of these, the author considers pituitrin best, because it stimulates the intestine to a tonic contraction, while eserine stimulates the rhythmic peristaltic movement. In such cases morphine with pituitrin may be administered. A localized peritonitis which is becoming more diffuse is favorably influenced by morphine, if peristalsis is still present in the involved and adjacent areas. If in the disease area peristalsis is absent and is not active in the surrounding zone, morphine is not indicated. The only occasion to use morphine, then, would be to quiet a restless and suffering patient. If the process begins to retrogress, morphine should not be given, because in this stage there is but a very small margin of safety between the contracted and the paralyzed bowel. If the obstruction is mechanical, which is most likely to occur late in the disease or in the recovery stage, then the use of morphine can only do a positive injury. The author believes that atropine and pituitrin are useful adjuvants to morphine in the treatment of peritonitis. "Atropine seems to be the very drug which is the

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(2) Interstate Med. Jour., October, 1917.

most useful as an adjuvant to morphine. Morphine paralyzes the vagus but stimulates the muscle of the intestine. Atropine at the same time inhibits the vagus, inhibits the longitudinal muscle layer and stimulates the circular layer so that the intestine is held in a tonic state. If these two drugs are combined with pituitrin, bowel peristaltic movements are inhibited, while the contractions of the circular fibres are stimulated, so that the bowel is held in a state of tonic spasm.''

Morphine Hyperglycemia in Dogs with Experimental Pancreatic Deficiency. J. Auer and I. S. Kleiner[3] report results of an investigation in which they found that, after largely abolishing the function of the living pancreas in dogs, by means of destructive injections, without resecting this gland, there was usually no marked hyperglycemia or glycosuria. However their series of experiments showed unmistakably that the subcutaneous injection of 1 to 2 mg. of morphine sulphate per kilo of body weight produces a much greater and prompter increase in the blood sugar of dogs with reduced amounts of pancreatic tissue than in normal animals. There is, the authors believe, an aspect to this morphine hyperglycemia which may be of practical importance. These dogs with a small or minimal amount of pancreatic tissue may legitimately be considered in a prediabetic stage in the light of much experimental work, especially that of Allen. On this basis, the morphine glycemia test may be of value to the clinician for detecting patients with a weakened carbohydrate metabolism, thus permitting the early institution of an appropriate dietary in order to prevent the potential diabetes from developing into actuality. The test moreover, is easily carried out, as less than 1 c.c. of blood will be necessary if the Epstein method (1914) is employed. Only three samples of blood, each 0.2 c.c. in amount, would then be necessary, the normal, control sample, and two further samples taken 1 and 2 hours respectively after the morphine injection. The amount of morphine given to the human subject can not, of course, be calculated kilo for kilo from the doses used for dogs; probably 20 mg. of morphine sulphate (1/3 grain) would suffice for an

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(3) Jour. Exper. Med., January, 1918.

adult. Whether the morphine test will yield the same result with human beings in the prediabetic stage as those which the authors obtained experimentally in dogs, only actual trial can determine.

The Place of Opium in the Therapeutics of Infancy and Childhood. J. P. Crozier Griffith[4] believes that the reaction which has followed the excessive use of opiates in pediatrics has gone too far and that many physicians are unreasonably opposed to the giving of opium in any form to children, and especially to infants. He hopes that we are now swinging back to a more rational and moderate view.

He admits that opium is a dangerous remedy. Given at the wrong time, in the wrong dose, or in the wrong case, it is certainly a poison. He also admits that the infant in the first three months of life is often remarkably susceptible to the drug, and this is true also, although to a much less extent, throughout infancy. Marantic infants, or those with threatening unconscious states, may be dangerously affected by it and the author has seen 4 drops of paregoric narcotize an infant 4 months old. This merely makes it necessary that, in giving opium, we make due allowance for the age and the susceptibility of the patient to this drug.

Though there is no drug which satisfactorily can replace opium for the relief of pain, it is on the whole of less service for this purpose in early life than later, because the suitable cases are fewer. To give an opiate to an infant with the colic of indigestion, is, as a rule, a mistake, for it diminishes peristalsis, and prevents the expulsion of the gas on which the colic depends. It is only in the exceptional cases in which the colic is so intense that the development of convulsions is feared (and these cases are few) that the administration of an opiate is wise. Children with acute articular rheumatism often suffer so greatly that opiates are needed, as in adult life, and should be given. In pain of appendicitis or of peritonitis from any cause, opium is quite commonly condemned on the ground that it masks the symptoms. On the other hand, when the diagnosis has been made, operative treatment determined on, and the

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(4) Penn. Med. Jour., May, 1918.

fact that opium has been given is known, the masking would appear to be a matter of indifference. Fortunately, as a rule, we may well do without it.

At the beginning of an acute febrile tracheobronchitis, with a frequent, dry, annoying cough, there is nothing, in Griffith's experience, which is superior to the administration of opiates in small, repeated doses. In spite of the apparent physiologic incompatibility, the drug may well be combined with ipecacuanha. When the secretion is becoming established, and the cough looser, other remedies are generally to be preferred. However, when the cough, although loose is frequent and harassing, an opiate mixture is required. Such cases are sometimes greatly aided, too, by atropine; but atropine in no way replaces the opiate; the purposes are different. The two may sometimes well be combined.

There is probably no better method of warding off an attack of spasmodic croup, than the giving of opium, ipecac, and perhaps antipyrine or a bromide in fairly full repeated doses during the afternoon. Asthma is undoubtedly relieved by opiates in many instances; though, owing to the danger of forming a habit, other remedies should first be tried. In moderate cases of pertussis, in which the patients get through the day well but are troubled at night, the administration of a mixture containing opium at bedtime, and perhaps again later, will often insure fairly good repose, and avoid the necessity of giving medicine during the day. When the cough of pleurisy and pneumonia is so frequent and harassing as to be a distinct source of danger in pneumonia, from the exhaustion which is produced, opium is some form should certainly be employed. There is however one condition in pneumonia offering a very positive contraindication to the employment of opium; *viz.*, the abdominal distention which occurs not infrequently in severe cases. This adds greatly to the danger by interfering through upward pressure with the cardiac and respiratory action. Opium only increases the lack of peristalsis and makes the condition worse.

In the vomiting of acute indigestion, opium has no place. However, some of the severe cases of recurrent vomiting are probably relieved by nothing else as well. The employment of morphine 0.0006 gm. hypodermically may save life. There are some cases in infancy where vomiting has become, so to speak, a habit of the stomach. In such cases prompt and remarkable improvement may follow the hypodermic administration of morphine.

In ordinary cases of eclampsia in infancy and early childhood opium is not needed. Many of the severe cases, however, seem not to yield to treatment until it is administered, best hypodermically.

In these days of antimeningococcus serum, we should not forget the intense pain from which the patient often suffers, and the relief which opium will give. Of course when coma is coming on, opium should never be given.

Griffith considers opium probably one of the best drugs for the treatment of acute pericarditis and endocarditis. It relieves the pain and cough, and will quiet the excessive cardiac action as no other drug will do. Even in the distress of failing compensation in chronic endocarditis and myocarditis it will often relieve the condition for a time and act as a cardiac stimulant. Digitalis is not suited to the acute cases, and of less value than opium for the immediate relief of the chronic ones. In threatening or established uremic symptoms of a nervous nature the drug is one of the most serviceable. In all cases of acute diarrhea in which there are symptoms indicating auto-intoxication of some degree, it is entirely inadmissible. When, for instance, there still exist vomiting, high fever, nervous symptoms, foul evacuations and distention of the abdomen, the effort should be made to empty the bowels, and to prevent food of an improper nature from entering them. On the other hand, after all danger of intoxication is apparently over, it not infrequently happens that numerous large, liquid movements persist and are a distinct element of danger through the loss of liquid from the economy. Under such circumstances opiates will do good by quieting the too active intestinal peristalsis, and they should certainly be used. For the frequent movements of ileo-colitis, accompanied by pain and straining, opium is distinctly needed, and should be given regardless of the presence of fever; which is not due in this disease to any auto-intoxication.

Morphine in Whooping Cough. Mark Sadler[5] calls attention to the fact that morphine is the agent which most diminishes irritation of the superior laryngeal nerve and that whooping cough is a neurosis of the respiratory apparatus, particularly involving the superior laryngeal nerve, although naturally this is not of necessity the specific causal factor. From the standpoint of clinical experience, it appears a settled question that morphine has a distinctly sedative action on the paroxysms and perhaps on the duration of the affection as well. Vomiting, though frequently following injections of morphine in adults, is almost always diminished or completely controlled.

The use of pantopon or morphine should be restricted to cases in which the paroxysms are frequent and prolonged, and to those in which laryngeal complications, spasm of the glottis, etc., occur, just as in croup or asthma. In other words, the use of morphine should be restricted to the dangerous spasmodic periods of whooping cough. The use of the alkaloid is to be prohibited in pulmonary complications with a defective defense of the lungs. Whenever there is a renal edema or a small amount of urine, the alkaloid must never be given. It is always well to look for albumin in the urine before prescribing the drug.

It is difficult to fix the doses of morphine suitable for children. Lust's method seems the most exact. It consists in giving the morphine in relation to the body weight, and not to the age of the child. Begin with one half milligram for each kilogram, in twenty-four hours, by the mouth; or one-quarter milligram in an enema of about thirty ml. Hypodermically, begin with one-tenth milligram per kilogram of body weight. After a few hours, another dose can be given without danger if necessary. Lust says that children rapidly acquire immunity against the drug. As to the maximum quantity of morphine that may be employed with safety, the pupil is the surest guide; if it contracts, the adminis-

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(5) New York Med. Jour., July 27, 1918.

tration of the drug must be stopped; and, when the miosis has disappeared, it can again be given.

HYPNOTICS.

A Good Hypnotic Combination. C. J. Douglas[6] considers hyoscine, hypodermically administered, as a valuable hypnotic; but, if uncombined, very uncertain in action, and often producing most undesirable symptoms. While at times it causes refreshing sleep, at others it produces loss of muscular coördination and of memory, accompanied by perpetual restlessness, so that unless restrained the patient insists on getting out of bed. He may fall about the room with the possibility of seriously hurting himself. If these untoward symptoms could be prevented, hyoscine would be one of our most safe and satisfactory hypnotics. This can be accomplished by combination with apomorphine, 0.001 to 0.0012 gm. Apomorphine administered hypodermically in small doses shuts off the stream of consciousness with valvelike precision. This makes it a most valuable hypnotic. Its action, however, while prompt, is transient. This defect is overcome by the hyoscine, the hypnotic effect of which usually lasts several hours. On the other hand, the muttering delirium which so often comes during the first hour after the administration of hyoscine, is prevented by the quick hypnotic action of the apomorphine. The synchronous action of these drugs may be expressed diagramatically as follows:

	First Hour.	Subsequent Hours.
Hyosine	Delirium	Sleep
Apomorphine	Sleep	

The author considers 0.0004 gm. of hyoscine as the average dose. In many cases, 0.0003 gm. is quite sufficient; and under no circumstances should 0.0006 gm. be exceeded. The careful regulation of the dose of apomorphine is important. If it is too large, it causes vomiting; and if it is too small, it is inert. The author

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(6) New York Med. Jour., December, 1917.

considers 0.001 to 0.0012 gm. usually sufficient. The two remedies should be mixed and administered hypodermically in one injection. If morphine is indicated, it combines well with the other two drugs.

"In the treatment of the excited stage of alcoholism and other mental ailments this combination is especially valuable. It promptly overcomes the insomnia of these patients, regardless of their wishes in the matter. To be able thus safely to force sleep even when the patient's unbalanced mind makes him earnestly desire to keep awake, is quite worth while, and is an accomplishment that gives satisfaction to every one concerned."

BROMIDES.

The Administration of Bromides in Epilepsy. H. T. Pershing[7] insists upon the necessity of maintaining the administration of bromides for years in the treatment of epilepsy; and he believes that this, in combination with certain hygienic precautions, will result in a great reduction in the number of attacks and that, in a not insignificant proportion of cases, the attacks may be prevented for years without deterioration of general health, provided the administration of the bromide is carried on skillfully.

Pershing uses as his average initial dose for an adult, 1.3 gm. three times a day in a liquid mixture. "If that prevents attacks, but brominism appears, the medicine must not be interrupted at all, but reduced 10 or 15 per cent. at a time until a dose that can be tolerated is found. Toleration may be increased by adding about 0.6 ml. of tincture of nux vomica to each dose, and also by adding arsenic, preferably as sodium cacodylate, from 0.002 to 0.005 gm. A laxative is often necessary, and the aromatic fluidextract of cascara can be added to serve this purpose. If the amount of bromide is inadequate, to restrain attacks, it is to be increased cautiously. When a dose is found which is sufficient and is well tolerated, it is continued for a long time, and then

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(7) Jour. Amer. Med. Ass'n., Sept. 15, 1917.

cautiously reduced. Dropping from three doses a day to two of the same strength is too great a change to make at one time, but one might change from three doses of 1.3 gm. to two doses of 1.6 gm.'' The author points out well the undesirability of prescribing ready-made bromide mixture, especially if the physician does not remember the exact amount of bromide in the mixture. A dose of 1.2 gm. may be too little and one of 1.4 gm. too much; and, supposing the dose is not just right and an increase or decrease of 10 per cent. is desirable, how is this to be accomplished? He also considers it desirable for the patient to measure his dose exactly by means of a graduate. The patient must understand that the prescription must never be discontinued even for a day, except by express order of the physician; and such orders should not be given, unless the reason is overwhelming. The first essential to successful treatment is to tell the patient of the tendency to recurrence, even after apparent cure, and of the need of faithful continuous coöperation on his part. The treatment must be extended over many years, perhaps over a lifetime, even though the attacks are arrested. The patient must form the habit of taking the medicine at the regular time, without rebelling or wondering when he can stop, just as he brushes his teeth, or combs his hair.

''In case the major attacks are held in check, but the minor ones remain as frequent as before, it will do little or no good to advance to large doses of bromide. Instead, from 0.3 to 0.6 ml. of tincture of digitalis or 0.03 gm. of sparteine added to each dose may be of distinct service. Or, if there is much nervous irritability, from 0.12 to 0.24 ml. of the deodorized tincture of opium with a corresponding increase in the laxative may be better. Occasionally, especially of late years, he has used small doses of thyroid with advantage, and some patients with low blood-pressure might profit by the addition of pituitary substance; but the author has not tried the latter in this disease. If status epilepticus supervenes, instead of trying to control the convulsions by increasing the amount of the bromide, one should keep this at the usual amount and give chloral in 1 gm. doses every two hours for the first few doses, or even every hour. If this does not quickly reduce the frequency of the attacks, inhalations of chloroform should be used. If respiration is threatened, atropine and strychine should be given hypodermically in the usual doses."

[What the author has said regarding the prolonged administration of bromides in epilepsy might also be said regarding their use in other certain neuroses, *e. g.* those of the menopause or of the neurasthenic who can not afford or obtain etiotropic therapy.—ED.]

The Exact Dosing of Bromides in Epilepsy and in Melancholia. E. Bernoulli[8] goes Pershing (see above article) one better in regard to accuracy, and probably efficiency of bromide medication, by insisting upon the necessity of controlling the daily dose of the sodium chloride ingested as well as that of bromide; for the degree of bromidation of the system is not only in direct proportion to the intake of bromide, but also in inverse proportion to the intake of chloride in the food.

The best measure for bromidation of the system is the relative proportion of bromide to chloride in the body. For exact determination, halogen analysis of the blood is required. However, for clinical purposes, halogen determination in the urine may suffice. Barnoulli has found that the relative amount of bromide in the urine is proportionate to that in the blood, though the percentage is somewhat smaller. According to his determinations, a relative bromide content of 20 to 25 per cent. in the blood, rarely 30 per cent., is required to suppress the attacks of epilepsy. The corresponding relative proportion in the urine ranges from 15 to 25 per cent.

As previously stated, the relative percentage of bromide in blood and urine is dependant upon the intake of chloride and bromide. The author has determined the relation of these two, and elaborated the following table, which enables one to determine at a glance what amount of bromide is required to attain a certain degree of bromidation when a given amount of chloride is ingested in food.

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(8) Cor.-Bl. f. schweiz. Aerzte, August, 1917.

Sodium Chloride in the Food.	Doses of Sodium Bromide Required to Produce Following Relative Proportion of Bromide in the Urine. (Halogen Equals 100 Per Cent.)			
	15 p. c.	20 p. c.	25 p. c.	30 p. c.
2.0 gm	0.6 gm.	0.9 gm.	1.2 gm.	1.5 gm.
3.0 gm	0.9 gm.	1.3 gm.	1.8 gm.	2.3 gm.
4.0 gm	1.2 gm.	1.8 gm.	2.4 gm.	3.0 gm.
5.0 gm	1.6 gm.	2.2 gm.	3.0 gm.	3.8 gm.
6.0 gm	1.9 gm.	2.6 gm.	3.5 gm.	4.5 gm.
8.0 gm	2.5 gm.	3.5 gm.	4.7 gm.	6.0 gm.
10.0 gm	3.1 gm.	4.4 gm.	5.9 gm.	7.5 gm.
12.5 gm	3.9 gm.	5.5 gm.	7.4 gm.	9.4 gm.
15.0 gm	4.7 gm.	6.6 gm.	8.8 gm.	11.3 gm.
20.0 gm	6.2 gm.	8.8 gm.	11.8 gm.	15.1 gm.

This table would be used in the following manner: assuming that we desire to reach a degree of bromidation, ranging between 25 and 30 per cent. of bromide in the urine, and we determined that the daily intake of sodium chloride averaged 8 gm., the dose of sodium bromide would have to range between 4.7 and 6 gm. If we choose 5 gm.; and, on gradually reaching this dose in the course of three weeks, do not obtain the desired effect, we would increase to 5.5 or 6 gm. As soon as the effect is obtained, we must reduce the dose, perhaps to 4.5 gm. if we wish to maintain the level of bromidation.

If, by reason of intercurrent sickness, food containing less chloride is eaten, an immediate reduction of bromide would be required. If, for instance, a patient requires 5 gm. of bromide, while taking from 10 to 12.5 gm. of sodium chloride daily, a sudden reduction in the intake of chloride by reason of milk diet to 2.5 gm. would require a reduction of bromide to 1 gm.

It is also easy to see that we may lessen the degree of bromidation to any desired extent by not only lessening the dose of bromide, but also increasing that of chloride.

To calculate the amount of chloride in the diet, the simplest method is to start with the amount of chloride contained in chloride poor food, which on a diet of bread and milk, and other chloride poor foods, amounts to about 4.5 to 5 gm. of sodium chloride. Strongly salted food such as cheese, ham, smoked or pickled meat, or sausages, must be eliminated from the diet. The additional amount of sodium chloride that we desire to permit the patient to take should then be weighed out every morning; and no more than this quantity be used in the preparation of the patient's food. If, for instance, we aim to keep the sodium chloride intake at 10 gm., from 5 to 5.5 gm. of sodium chloride may be used in the salting of his food. Soups should be salted with the dose of bromide the patient is to receive, instead of using sodium chloride; and the author finds Sedobrol tablets very convenient for this purpose (each tablet contains from 1.1 to 1.2 gm. of Na Br. and 0.1 Na Cl.). To improve the seasoning of the food, vegetable spices should be used more liberally than usual.

In the treatment of depressed mental condition, such as melancholia, it is according to Ulrich (1916) necessary to push the bromide up to the first stage of bromide narcosis, that is, mild paresis or disturbance of coordination, such as swaying gait, uncertainty in standing, disturbances in speech, writing, or memory, as well as, increased desire for sleep. When this stage of intoxication is reached, the patient finds himself in a condition of euphoria, which may then be maintained by gradual reduction of the bromide. The author has found that this stage of intoxication is generally reached when the relative percentage of bromide in the urine ranges between 25 and 30 per cent. He insists that it is very undesirable to reach this state of intoxication rapidly, and urges that at least three weeks be taken in gradual increase of dose. When the desired effect has been obtained, the dose should be maintained at a certain point and then very gradually reduced. The author agrees with Ulrich that this method is, as yet, less suitable for private practice than for treatment in institutions.

MISCELLANEOUS.

DIURESIS.

Forced Diuresis in Experimental Poisoning with Diphtheria Toxin. This was found useless by W. D. Sansum,[9] who after or even simultaneous with the administration of a fatal dose of diphtheria toxin, gave, by means of a special pump, prolonged accurately timed intravenous injection of large amounts of one of the following three diuretic solutions: (1) an alkaline hypertonic salt solution (sodium chloride, 2.2 per cent., and sodium carbonate, 0.371 per cent.; (2) an 18 per cent. glucose solution, and (3) an 18 per cent. glucose solution having the salt content of Ringer's solution (sodium chloride, 0.7 per cent., potassium chloride, 0.03 per cent, and calcium chloride, 0.025 per cent.).

In these experiments water was passed through dogs at the rate of 30 ml. per kilogram of body weight per hour for three or four hours. The same procedure, if carried out in the case of a man weighing 70 kg., would imply the intravenous injection of 2,100 ml.. of fluid per hour for a total of 6,300 or 8,400 ml. in three or four hours, nearly all of this passing promptly out by way of the kidneys and bowel. The treatment appeared to have done harm rather than good. These negative results discourage attempts to apply an identical procedure in clinical cases of diphtheria.

[It would be of great practical value, if we would know what poisons can be washed out of the system and what poisons can not be thus removed.—Ed.]

Uranium Nitrate.

The Value of Uranium Nitrate in the Treatment of Diabetes Mellitus. Reynold Webb Wilcox[10] has found uranium nitrate of use in certain cases of diabetes mellitus. This substance, which occurs in form of light yellow prisms; odorless and of a bitter, astringent taste and is soluble in 1.2 parts of water and freely soluble in alcohol or ether, was first used in diabetes mellitus by Samuel West in 1895. This author reported good results with this agent in two patients suffering from this disease. He found that after a short time the patients reported that their thirst was greatly relieved and that the frequency of urination and the quantity of urine was much reduced. His method of administra-

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(9) Jour. Amer. Med. Ass'n., March 30, 1918.
(10) Med. Record, Sept. 1, 1917.

tion was as follows: He commenced with a small dose, 0.06-0.12 gm. and increased slowly after an interval of a few days up to 1.0-1.3 gm. thrice daily or, until the desired effects were produced. The remedy is best given freely diluted with water, after food.

Wilcox summarizes his own results with this remedy in diabetes mellitus. Nine patients of the neurotic type of this disease were apparently uninfluenced, as to their glycosuria, by the remedy. Of the hepatic type, fifty-four received the remedy, and forty-six apparently received benefit in that thirst, polyuria, and glycosuria were improved, but generally only so long as the remedy was continued. The usual daily amount administered was from 0.03 to 0.09 gm.; on a few occasions it reached 0.18 gm. Pancreatic diabetes naturally varies within wide limits owing to the diverse conditions affecting the gland. Of twenty-seven patients, twenty-two were improved as to the symptoms above noted, temporarily at least, but it was with difficulty, if at all, that any really lasting benefits could be obtained. In all the instances in which Wilcox has employed uranium nitrate he has never noticed any untoward gastric or intestinal symptoms nor any signs of blood or renal disturbances; careful observation has been especially directed toward the early detection of the latter. In some instances, especially in the hepatic and pancreatic forms of the disease, the remedy, when its use has resulted in the diminution of glucose to a trace or to total absence, has been continued for months and, for some patients, for years.

The author, therefore, concludes that uranium nitrate may be employed with good effect in the treatment of diabetes mellitus. It will at times markedly diminish the amount of glucose in the urine, and this diminution, often to traces, will persist so long as the remedy is continued. In other instances, it is entirely without effect. Its use then is purely empirical. When its use is successful in reducing glucose, lessening thirst, weakness, and emaciation, there is no valid explanation of its action.

So far as animal experimentation has gone, the intravenous administration of uranium salts produces a characteristic nephritis, glycosuria, and a peculiar edema. It seems that this toxicity of uranium salts is associated with acidosis, because the administration of sodium carbonate lessens this and, as well, diminishes the degeneration of the renal epithelium.

On the other hand, as used by mouth in the human, this substance has been administered in large doses and over long periods of time, even years, without any digestive symptoms or renal signs, probably because of slight degree of absorption, and apparently with great benefit to patients suffering from actual diabetes mellitus.

TOXICOLOGY.

PROTEIN POISONING.

Serum Sickness. E. W. Goodall[1] presents the results of observations which are the outcome of 22 years' familiarity with the disease as it occurred in the course of serum treatment of diphtheria, and more particularly from a study of 3,502 cases occurring among 10,000 consecutive cases of diphtheria during the period January, 1898, to June, 1908.

It will be convenient to deal with serum sickness under three headings: First, the ordinary reaction as it occurs in the vast majority of persons who undergo an attack after a primary injection of serum, or a series of injections given within a week or so; secondly, accelerated, aggravated or unusual reactions occurring in persons who have been reinjected after a lapse of a period of at least ten days from the primary injection; and, thirdly, abnormal reactions occurring in a few persons after a primary injection.

I. Serum Sickness After Primary Injections. In cases of this class the most common symptom is a rash, with or without a rise of temperature. In the vast majority of cases, the rash is one of two kinds, or a combination of the two, urticaria, and a variety of erythema, especially the marginate or circinate. Next in frequency is a papular and macular rash, something like that of

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(1) Lancet, March 2, 1918.

measles. A scarlatiniform erythema is unusual. Very exceptionally the erythema becomes petechial or purpuric; very rarely indeed does it become vesicular or bullous. It is not at all uncommon to see two separate rashes, parted by an interval during which the skin is quite free from eruption. Both the rashes may be urticarial or some form of erythema; or one rash may be urticaria and the other erythema; the last is the most frequent combination. The longest interval Goodall saw was twelve days. Usually it is less than a week. A solitary injection of serum may give rise to two and even three rashes, distinct as to their nature and date of appearance. This phenomenon might be due to the practice which obtains, of mixing the sera of different horses, or to the fact that each of two different proteins in the serum can produce a separate reaction and that the latent periods of these reactions differ in length of time. Itching is very common; and, if the rash is profuse, there may be considerable, though transient, edema of the skin. A rash occurs in rather more than one-third of the cases injected. The rash is often accompanied by pyrexia. A rash seldom persists for more than two or three days without some elevation of temperature. In a severe case, the fever may go on for ten days, a fortnight, or longer. It is usually of the intermittent type, and seldom very high. Occasionally serum sickness shows itself by fever without a rash.

In some of the more severe cases there is moderate enlargement of the glands, especially those of the neck. There may also be tonsillitis. During the illness there is marked leucopenia due to diminution of the polynuclear cells.

Perspiration is usually a prominent symptom. Not infrequently, too, there is albuminuria, and vomiting is not uncommon.

Arthritis amounting to no more than "joint pains" occurred in 4.3 per cent. of the cases. It is nearly always accompanied by a rash, and usually also by pyrexia. The arthritis seldom persists for longer than two or three days, and very rarely recurs. Suppuration of a joint is very rare. In such instance, it is almost certain that the inflamed joint was infected through the circulation, from a pyemic focus.

The author has never seen a case of the arthritis of serum sickness in which the heart was involved, as happens in rheumatic fever. In very few cases has he seen edema of the scrotum, and occasionally also of the penis, lasting from one to eight days. In very few cases, has he observed transient hematuria, but Goodall has never met with a nephritis due to serum.

The disease is more frequent in the female than in the male sex, and the difference in the incidence is most marked in patients over ten years of age. The frequency of the disease varies directly with the volume of serum injected. As children receive a relatively larger volume of serum than do adults, they may perhaps be expected more readily to fall ill of serum sickness. In the vast majority of cases there is a distinct period, free from any symptoms attributable to the serum, between the injection of the serum and the onset of the disease. (See Diagram 1, Fig. 10.) The most common length of the period was 9 days (93 cases).

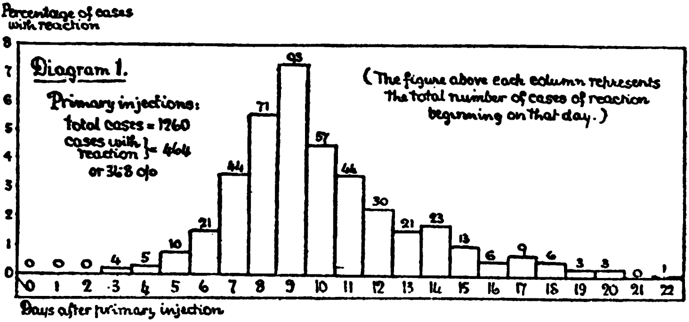

Fig. 10.

Thus, the serum sickness as it occurs in most cases after a primary injection or series of injections, shows itself, after a latent period of several days, commonly 6 to 15, with an attack of fever, a rash, and occasionally arthritis. It will be convenient to designate this usual form as the "normal reaction" to serum.

II. Serum Sickness in Re-Injected Cases, that is, persons who have received serum treatment a second time after the lapse of a period from the first injection which is at least equal, in length, to the latent period of the normal reaction. Such persons frequently have abnormal reactions. It should be particularly noted that when injections are administered at short intervals, within a day or two, abnormal reactions are not to be expected. In a re-injected person the reaction may be a normal one. But usually the reaction departs from the normal, and its abnormality may be shown in one of three ways, or a combination of them.

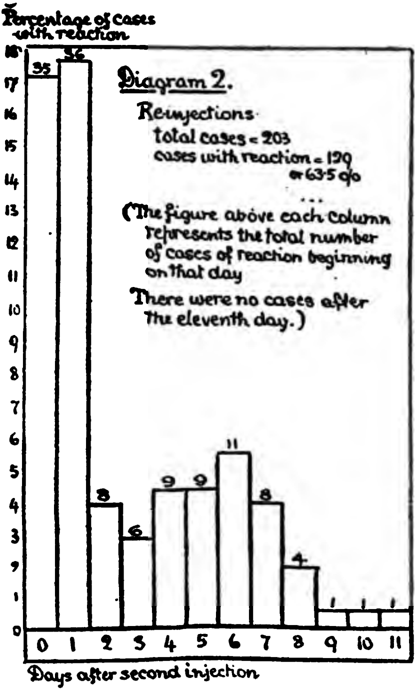

Fig. 11.

(1) The most common abnormality is shortening of the latent period. This is well shown in Fig. 11, Diagram 2). In the bulk of the re-injected it is shorter than a week.

In 71 of the re-injected cases in which a rash occurred, or 55 per cent., the latent period was under two days. Of the 35 cases in which the latent period was less than 24 hours, in 32 it was less than six, and in 23 of the 32 less than two. In 3 cases indeed the latent period was absolutely abolished. It should be mentioned that the same patient may undergo more than one reaction.

(2) The second abnormality is exhibited by unusual severity of the attack. The rash, usually urticaria, often consists of gigantic wheals, is very profuse, and comes out with extraordinary celerity. The mucous membranes of the mouth, nose, pharynx, larynx, and possibly also of the stomach, seem to be invaded. The tongue may be swollen, and respiration embarrassed. There may be vomiting and epigastric pain. In a few cases the patient is seized with faintness and muscular weakness. The temperature may, for a short time, be high. Usually these most unpleasant, not to say threatening, symptoms pass off as quickly as they arose. Occasionally there is an exceptionally smart attack of arthritis.

(3) Lastly, there are some cases, happily also few in number, in which unusual symptoms occur. They are always part of an immediate reaction, and consist of rigors, sometimes severe and prolonged, muscular twitchings, and even convulsions, drowsiness, dyspnea (not apparently due to urticaria of the larynx), collapse, vomiting, and a high temperature. There may also be abdominal pain and diarrhea. The vast majority of cases of serum sickness, normal or abnormal, recover completely. Goodall never encountered one which became chronic.

The facts brought forward show that these persons are more susceptible to serum, not only than are others, but also than they themselves were at the time of the primary injection. The shortest period that the author has known, between the primary and the secondary injection, when the occurrence of an abnormal reaction has demonstrated the supersensitive condition, has been 16 days. The answer to the question how long the supersensibility lasts, has not yet been furnished, at any rate so far as man is concerned. Possibly it may last for a person's lifetime. Goodall has known it to be present upward of seven years after the primary injection.

III. Abnormal Serum Sickness Without Previous Serum Treatment is characterized by absence of the latent period and excessive severity of the symptoms. It is, indeed, this group which has furnished nearly all the instances of death immediately after an injection of serum.

The symptoms are: irritation (sensation of itching and burning), with very acute edema of the skin and of the mucous membranes of the nose, mouth, and throat; urgent dyspnea and cyanosis; and foaming at the mouth. In some cases, there is a rash, usually urticaria; in others there is not. In fatal cases, death has been due to inability to breathe, and there may be convulsions and coma. Respiration stops before the heart ceases to beat. In not a few of the cases in which fatal or alarming results had followed the use of serum the patient was the subject of asthma in one of its many varieties, and those persons in whom an attack of asthma is excited by the emanations from the horse seem especially to be prone to fall victims to these evil effects of horse serum. However, not all asthmatics are subject to this disease; some of them, indeed, receive most distinct relief from their asthmatic attacks. The immunity from the fits of asthma has, however, proved in most instances to have been only temporary.

From the experiments which laid the groundwork of our knowledge of anaphylaxis, certain facts have emerged most clearly. One is, that in order to sensitize an animal a protein substance must be employed. Another, that the protein may be any protein, vegetable or animal, provided that, in respect of animal protein, the protein is not derived from the same species of animal as the one under treatment, or from a very closely allied species. A third is, that in order to evoke the anaphylactic symptoms, the same protein as was used for the sensitizing, must be used for the reacting dose. A very small dose will sensitize; for the reacting dose a larger one is usually necessary. Another important fact is, that for the same species of animal, whatever be the protein, the symptoms are the same. Hence, in man the anaphylactic variety of horse serum sickness is, in accordance with the law mentioned, but an instance of what may be termed protein sickness in general.

An interesting and important question is, how do those persons become sensitized who have never before received an injection of serum? Experimental evidence supplies two possible answers. Rosenau and Anderson showed that the anaphylactic state can be transmitted by the female guinea-pig to her offspring, whether she has been sensitized before or after conception. Again, the observers, just referred to, state that supersensitiveness may be produced in quinea-pigs by feeding them with excess of protein.

In conclusion, Goodall strenuously objects to the loose use of the term anaphylaxis. Thus, in his opinion, the disposition to stamp as examples of anaphylaxis a large number of affections, such as shock, which follows severe burns, exophthalmic goiter, migraine, epilepsy, and the like, is premature. There are also grave objections to the hypothesis that the acute infectious diseases are instances of anaphylaxis. For the symptoms of anaphylaxis are the same in the same animal, whatever be the sensitizing protein. Therefore, the acute infectious diseases ought more closely to resemble one another than they do; there should, in fact, be hardly any difference between them, so far as their symptoms are concerned.

The author, on the other hand, thinks that in the clinical manifestations of serum sickness, supplemented by the experimental evidence, we find the key to the cause of a very large number of rashes and their accompanying symptoms. Horse-serum sickness is a special and artificial variety of protein sickness and if we find the symptoms of the sickness we may suspect protein poisoning.

Beef Serum in Prevention of Serum Sickness. Prof. J. Penna[2] reports the almost complete absence of serum sickness or other disturbances from beef serum. Anti-

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(2) Buenos Aires Letter, Jour. Amer. Med. Ass'n., Aug. 17, 1918.

tetanus and antidiphtheria serums prepared with beef serum were injected in a total of 435 patients and only 1.4 per cent. exhibited any signs of serum sickness. Further experiments apparently demonstrate that normal or antitoxic beef serum has a prophylactic action when injected before the horse serum. Mixed with horse serum, with excess of the beef serum by at least one-third, it materially reduces the accidents from serum treatment. Used after horse serum it has no prophylactic value against the latter.

The Relation of Circulating Antibodies to Serum Disease. Warfield T. Longcope and Francis M. Rackemann[3] carried on an investigation to determine what relation, if any, existed between the formation of antibodies to horse-serum and the course of serum disease. To demonstrate the antisubstances all the three methods in use for this purpose were employed: First, the test for precipitins; second, the demonstration of anaphylactin by the passive transfer of anaphylaxis by the patient's blood serum to a normal guinea-pig; and, third, the presence of specific skin reaction. Their results showed that precipitins and anaphylactic antibodies were much more likely to be found in the blood-serum of patients who suffered from serum disease following the injections of horse-serum than in patients who escaped serum disease. In the latter instances precipitins and anaphylactic antibodies were not observed. The skin reaction, on the other hand, made its appearance irrespective of the amount of serum administered or the method of administration and appeared whether or not serum disease developed.

The observations recorded show that serum sickness is essentially dependent upon a reaction which takes place within the cells of the body and is probably due to the formation of a toxic substance within these cells. Following this violent cellular reaction antibodies for horse-serum are at first slowly and later rapidly extruded into the circulation in great concentration. As the antibodies rise in concentration the antigen rapidly disappears and coincident with this reversal in antibody-antigen content of the serum, serum sickness abates

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(3) Jour. Exper. Med., March, 1918.

and the patient recovers. Should the antibody formation be slight in amount, the antigen may persist in large quantities in the circulation and the disease may be prolonged or may relapse. It seems highly probable that, during the incubation period, antisubstances are being formed within the cells and that at the time of onset of serum sickness, which is often explosive in character, there is a sudden union between the antibodies within the cells and circulating antigen which bathes the cells. It is probable that the extrusion of these antibodies into the circulation is the result and not the cause of serum sickness. Their presence serves to neutralize or destroy the antigen and thus determines the recovery from serum sickness.

Proteose Intoxications and Injury of Body Protein. G. H. Whipple, and Donald D. Van Slyke[4] investigated the reason for the fact that a single injection of toxic proteose in a fasting dog will cause a great rise in the base-line level of nitrogen elimination, indicating a great destruction of body proteins following a single intravenous toxic injection lasting from 2 to 7 days. They found that the changes observed in the blood non-protein nitrogen are identical with those which follow the feeding of large amounts of meat. These facts indicate that proteose intoxication causes an abnormally rapid autodigestion of tissue proteins, but that the nitrogenous end-products are, in chief part at least, the same as those that result from normal catabolism of food proteins. There is no evidence that the autolytic products play any part in causing the intoxication. The possibility of such a part and a resultant vicious circle is not excluded.

WOOD ALCOHOL POISONING.

Symptoms and Treatment of Wood Alcohol Poisoning. A. O. Gettler and A. V. St. George[6] report recent poisoning in New York of over thirty persons, six of whom died, from use of a whisky that on analysis proved to contain a considerable amount of wood (methyl)

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(4) Jour. Exper. Med., August, 1918.
(6) Jour. Amer. Med. Ass'n., Jan. 19, 1918.

alcohol. Inasmuch as refined wood alcohol tastes like ethyl alcohol, and is considerably cheaper, the adulterator buys the latter; and, ignorant that severe poisoning, blindness and often death lurk within it, uses it as a diluent of whisky, in the preparation of essence of peppermint, Jamaica ginger, lemon extract, punch, cologne, liniments, Florida water, bay rum, witch hazel, and in the arts in lacquers, varnishes, etc.

All the patients had taken whisky a short time previously, and all complained of violent abdominal pains, incessant vomiting and extreme weakness. Three of the patients complained of blindness. Three came into the hospitals in coma. The important points in all the physical examinations were slow respirations, dilated pupils, weak and rapid heart action, cold and clammy extremities, and deep coma, ending in death with cardiac collapse. In the chronic type of cases, blindness is the chief symptom. The blood and urine and the brain shows the presence of methyl alcohol.

Treatment. As, for a considerable period of time, the alcohol is excreted unchanged into the stomach and intestine it is important that early and frequent gastric and rectal lavage be carried out. The stomach washings should be immediately examined for wood alcohol, for the procedure for which the reader must be referred to the original article. Intravenous saline or sodium bicarbonate infusions and phlebotomy and transfusions, if the latter can be had quickly, should be administered. In addition, warmth and strong stimulation with strychine, digitalis, caffeine, camphor, epinephrine and oxygen must be given.

The authors suggest that legislation be enacted bringing about the prohibition of the sale of wood alcohol for domestic purposes, similar to laws now obtaining in Great Britain and Germany.

Poisoning from the External Use of Wool Alcohol. Robert E. MacKechnie[7] states that, while quite a number of cases of poisoning from the ingestion of wood alcohol have been reported, as well as numerous cases of "poisoning by inhalation," probably he reports the first

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(7) Canad. Med. Ass'n. Jour., March, 1918.

definite case of poisoning from external use to be recorded. The patient, a woman aged forty-five, had received a compound comminuted fracture of the leg. To a raw surface, about two by one and one-half inches in extent, Columbian spirit, that is refined wood alcohol, was applied, when the doctor ordered an alcohol compress. The compress was covered with oiled silk. After two days' treatment by the compress, the patient became very drowsy, while after three days' treatment the symptoms were more pronounced. She was nauseated at times, and complained of blindness. Respirations were then twenty-eight and very shallow, pulse 88, temperature 97°, face flushed with dilated pupils, suggesting belladonna poisoning, but no thirst. It was now recognized as a toxic case, and the application at once discontinued. But in spite of the discontinuance on the fourth day, the fifth was the most critical. The patient was in a very low condition, pulse 96 and irregular, temperature varying from 100.2° down to 96.6°, rising again to 100°, breathing hurried, and patient almost in a stupor. However, by the next day improvement began, and soon she was back to her condition previous to the use of alcohol; all but the eyes. Here a slight improvement was noted on the seventh day. Following this there was a very gradual improvement in sight for some months, until finally a resting stage was reached, at which the patient now is. She can distinguish the form of a person, if the light is good; but can not tell who it is, except by recognizing the footstep or the voice, even at three feet distance. She can feed herself, but not by sight. When one comes to consider the comparatively small area through which the absorption took place, it emphasizes the danger of allowing so powerful a poison to be taken into the sick room. That poisoning can occur by absorption through the intact skin is not yet proven. Crawford described a case in a woman of sixty, who after wood alcohol rubs for two weeks developed dimness of vision, 15-20 in right eye, nil in left, with a grey atrophy of the disc. If this is a true case of wood alcohol poisoning by absorption through the skin (it might be by inhalation from repeated rubs on an extensive scale, and also a cumulative effect), then this drug should be banished entirely from personal use.

ALCOHOLISM.

The Treatment of Alcoholism and of Delirium Tremens. Joseph C. Doane[8] considers the cure of chronic alcoholism most difficult, if not impossible, of accomplishment. He can make but one recommendation for the treatment of this class of patients, as met in city institutional work—a long-time commitment to a municipal farm for inebriates, where work may fill the want which pathologic appetite has failed to satisfy. "Every municipality of the first class should have a farm for inebriates, to which such patients could be committed for not less than one year; and where authority for retention of these patients could be enforced. Special provision should be made for medical care prior to above commitment."

The author has but rarely seen a patient in alcoholic delirium in whom a history of self-imposed abstinence or persistent emesis, prior to onset, was not obtained. Moreover, one usually finds the patient to be of the heavy-drinking type, showing great alcoholic tolerance, and one who, though he may become intoxicated, requires very large amounts of liquor to produce that condition. Doane agrees with Mercier who believes that it is not the amount of alcohol which the patient drinks, but the sudden withdrawal of alcohol that does harm; and he considers alcohol in decreasing doses, acting as a hypnotic, as the important drug in prophylaxis of delirium.

It appears to Doane that a rather definite period of incubation exists in delirium tremens, and likewise a similar period through which the delirium usually runs. Hence this disease may be divided into two fairly definite stages, and the treatment should vary accordingly. Thus alcohol in doses proportionate to the amount usually consumed, has apparently aborted an attack, when the patient was only showing the pre-

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(8) Pa. Med. Jour., November, 1917.

monitory insomnia, restlessness and tremor. But he has never seen alcohol show any specific properties during the second stage of active hallucinosis. The preventive treatment gives best hope of good results. Administration of the bromide in doses of 4.0 gm., usually every fourth hour, frequently every second hour; cold packs in sthenic and warm packs in asthenic patients; hypernutrition, with careful attention to bowels and bladder, with suitable amounts of alcohol, especially when alcoholic delirium complicates some other acute condition, will frequently abort a threatened attack. The author does not believe that chloral and morphine are drugs necessary in the treatment of this condition, and he has seen much harm done by their routine use.

Once active delirium is present, the author is convinced that we have an acidosis to deal with. Hence alkaline intravenous injection of a solution suggested by Hogan (1916) was tried. Sodium bromide, 10.2 grams, sodium chloride, 5.8 grams, and sodium bicarbonate, 8.4 grams, in a liter of sterile water and glucose chemically pure, 80 grams, in 250 cubic centimeters sterile water, were injected into the median basilic vein, under aseptic precautions. The rationale of this treatment is as follows: The sodium bromide is expected to act as a sedative, and it acts with the other ingredients used in rendering the blood hypertonic. The sodium bicarbonate is given to raise the alkalinity of the blood. The glucose not only acts as an easily oxidized food, because most of these patients are suffering from starvation, but also augments the dehydrating action of the whole solution. The danger of this method appears to lie in placing a greater load on a circulatory system that is so frequently impaired. The results with this injection, as rational as it seems, have not been very encouraging in the nine cases in which it was tried and a striking result was obtained in only one case.

Routine spinal drainage is advisable. Intraspinal injection of magnesium sulphate solution, 1 ml. of a 25 per cent. solution for every 25 pounds of body weight causes the development in about 50 per cent. of the patients of paraplegia with lost knee jerks, lost plantar reflexes, and paralysis of the sphincters. Complete return of normal function and reflexes usually occurs in from twenty-four to forty-eight hours. These patients usually showed improvement within a few hours. Ten out of the first twelve so treated recovered; five were very slow in recovering power in the lower limbs. This method only has a place as an emergency measure.

The prognosis in all second stage cases of alcoholic delirium is grave, the mortality running from 25 to 35 per cent.

MORPHINISM.

The Application of Psychotherapy in the Treatment of Morphinism. C. B. Pearson[9] says: "Practical psychotherapy consists in attempts to influence the mental attitude or mental processes of the patient in such a way as to assist in bringing about a cure. I rely upon it in the management of morphinism not only as a curative agent but also as a substitute for force or surveillance. I can not conceive of a successful application of psychotherapy in the treatment of morphinism by one who is ignorant of the addict and his ways."

Most prominent among the mental symptoms of morphinism, are secretiveness and cowardice. Both result from lack of self-confidence which is the keynote of the psychology of morphinism. The addict is secretive because he imagines that others have as poor an opinion of him as he has of himself. He is cowardly because self-confidence is the very basis of all courage. Secretiveness is a better gauge of the severity of morphinism than physical deterioration. This secretiveness is responsible for more failures in treatment than anything else, for it causes the patient to postpone institutional treatment; and, when he does take it, not to give sufficient time to it or to his convalescence. The chief remedy against this condition is repeated suggestion. It will not do one particle of good to let the patient know what you think about the matter. The thing to be done is to get the addict to think voluntarily about

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(9) Interstate Med. Jour., January, 1918.

the matter as you do. The idea that one should try to plant in the addict's mind is that secretiveness is pathologic, and to get him to perceive its manifold disadvantages and on the other hand the good that will be done by getting rid of it. When an addict throws secretiveness to the winds he burns his bridges behind him and he will be compelled to make good whether he wants to or not.

Cowardice is another bond that binds the addict to his slavery, although it works in a different way. This is not an obsession, it is a condition of deteriorated virility and morale. The author suggests there might possibly be a connection between this cowardice and arrest of sexual function, so common in these cases or that there is some other interference with the secretions of the ductless glands of the body. Fortunately it is easier to manage than the secretiveness. For its relief we can use both suggestion and tact. All we need to do in many instances is to divert the patient's attention. Sometimes when you see that a patient's courage is failing all you have to do is to approach him and say very seriously to him that you are very much pleased with his conduct and that you are delighted to see that he is making a very brave fight indeed. So one has to bolster them up constantly, jolly them up, flatter them up, and sometimes cuss them up, just any way at all to keep them encouraged and fighting the good fight at all times. Cowardice, being one of the psychic damages of the drug, it is certainly good therapeutics to correct this as far as lies in our power. The management of these cases without restraints contributes towards this end. To lock a patient up is to make use of a harmful form of suggestion. For what conclusion can the addict gather from the fact that he is locked up except that he is an incompetent weakling who cannot be trusted? The patients exercise harmful suggestion upon one another unless you watch them and prevent it. The pessimism of the patient should be overcome by a powerful optimism. Just because the addict has none too good an opinion of himself, he is for this very reason morbidly sensitive as regards the opinions of others. Hence these patients should be treated with studied respect. Under no circumstances should an addict be ridiculed or treated with contempt.

Another important symptom of morphinism is the obsession that life can not be lived comfortably by them without morphine. As a matter of fact the very opposite is the truth. For no one can live comfortably and be at the same time deep in morphine. The reason for this obsession is the fact that the patient has been very decidedly uncomfortable whenever he has tried to do without morphine or even when he has tried to cut down the dose. When the addict tells us that he is feeling fine he intends no deception. No one can take morphine for 20 years and remember anything at all what real health feels like. This obsession is pathological and must be overcome. While accuracy of dosage and smoothness in the reduction make for the patient's comfort, the comfort and well being of the patient can be greatly enhanced by attention to the psychotherapeutic end of it and also by attending to the ordinary therapeutics of morphinism, *i. e.*, medication, diet, rest, exercise, etc.

MISCELLANEOUS POISONINGS.

Lead Poisoning is believed by W. Louis Chapman[10] to be the cause of many cases of obscure and atypical gastro-enterologic and neurologic disturbances which are difficult of diagnosis and resistant to treatment. It causes many symptoms before gross pathology is apparent. "It may be," he says, "that in plumbism we have an important etiologic factor as yet unappreciated in gout, the arthritides, occupational neuroses and gastroenterologic manifestations without gross pathology as revealed by our present methods of investigation." He also believes that chronic plumbism is a wide spread cause of dental disease such as interstitial and suppurative gingivitis, recession, focal necroses and premature loss of teeth. The lead line appears later. The examination of the urine for lead is as yet our chief means of diagnosis in this class of cases. This examination should be

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(10) Rhode Island Med. Jour., January, 1918.

undertaken after one week's treatment with potassium iodide, as the elimination into the urine is increased thereby. An amount exceeding 0.5 mg. per liter should be considered diagnostic of lead poisoning. These patients are greatly improved by potassium iodide. The author also believes that quinine is of value in this condition.

Blood Changes in Gas Poisoning. James Miller and Harry Rainy[1] have found that a patient who has been gassed severely enough to produce symptoms lasting for some time shows a more or less marked relative lymphocytosis. This change in the blood takes some time to develop. Probably three to four months at least must elapse before the change appears, but once it develops it does not disappear for some time, apparently for at least a year, if symptoms of any kind persist. As regards the number of the leukocytes per cubic millimeter there does not appear to be any marked change, if anything there is a slight reduction.

A Case of Phenol Poisoning with Recovery is reported by R. M. Wiley.[2] A young woman, eighteen years of age, took two teaspoonfuls of phenol. She was unconscious, apparently in collapse, with muscular tremors and twitchings. The patient's pulse was small and rapid, respiration decidedly labored, and the pupils were contracted. Wiley at once gave the patient by mouth about one-half of an ounce of pure grain alcohol—all that he had in his emergency grip. Being unable to pass the stomach tube to wash out her stomach, Wiley at once administered 0.003 gm. of apomorphine hypodermically, and was much gratified by a prompt emesis. He also gave epsom salts; and, in addition to this, administered albumin, flour and water, and olive oil. The author is aware of the fact that there is a divergence of opinion regarding the administration of olive oil. The olive oil certainly did no harm in this case. He also administered atropine hypodermically. The patient remained desperately ill, apparently unconscious, hovering between life and death for many hours and was unable to speak above a whisper for a day and

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(1) Lancet, Jan. 6, 1917.
(2) Virg. Med. Semi-Month., March, 1918.

night. Alarming respiratory symptoms and great gastric pain were repeatedly relieved by the administration of hypodermic of morphine and atropine. In a week all the symptoms had disappeared entirely and the patient was discharged as recovered.

Death Following the Administration of Theocin. William W. Cadbury[3] reports two cases in which therapeutic doses of theocin were followed so quickly by signs of heart failure and death that it seems certain that the drug was responsible for the fatal outcome. The total dose in one case was 0.6 gm., in the other, 1.0 gm. It was divided into three doses, taken at one or two-hour intervals. Both the patients were Chinese, suffering from organic heart disease and edema. One patient died within a few hours, the other within a few days after taking the dose, in both cases precordial distress, dyspnea, and rapid, feeble pulse appeared soon after taking the powders.

NON-PHARMACAL THERAPEUTICS.

PSYCHOTHERAPY.

This most important portion of our therapeutic armamentarium is not yet receiving adequate recognition. The great practical value of such studies of the psychology of the patient as are abstracted below can not fail, it seems to the editor, to appeal to the physician, no matter whether he be a general practitioner or a specialist.

Psychotherapy in Children. In an admirable article that ought to be read in its entirety, H. C. Cameron[4] describes the origin and treatment of a number of common disorders of conduct in childhood. He points out that perhaps the most striking quality of the child, and, especially of the nervous child, is his extreme susceptibility to suggestion. He has no knowledge of his own individuality apart from ideas derived from those around him. If he is given the reputation of eating

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(3) Jour. Amer. Med. Ass'n., Jan. 5, 1918.
(4) Practitioner, February, 1918.

well and sleeping well, of having a regular action of the bowels, of making no fuss when he falls, of not being afraid of the dark or of animals, etc., it will not occur to him to question that these things are characteristic of him. If every day we make the opposite suggestion to him, whether by the subtle communication of our own worries and apprehensions or openly by what we say of him in his hearing, then with equal facility he acts in accordance with these ideas derived from us. Undue solicitude and unwise suggestions about the child's eating, sleeping or bowel movements, may create the condition that is feared, which is likely to be maintained by an attitude of negativism, on the part of the child. Thus the child may come to see himself—and take great pleasure in the thought—as a strange child whose peculiarity in refusing to drink milk, or eat meat, green vegetables, or milk pudding creates a pleasant stir, and excites considerable interest in the minds of the grown-up people around him. The only way to cure the fault is to reverse the suggestion, to seize every reasonable opportunity to speak before the child of his improving appetite, to say that he now refuses nothing, or even at times to take his plate away, saying that he has eaten so much that he must eat no more. Above all, we must try to hide from the child that we care at all if he eats but little. The resistance to food may even develop vomiting if, after much coaxing, struggling, and protesting, the food is forced down in spite of obvious disgust.

"As common and almost as distressing as refusal of food is refusal of sleep. Here, again, the difficulty is caused by unwise suggestions made to the child. His attention has been directed to the difficulty. It is foolish to bid a wakeful child to go to sleep, to exhort and to urge him. No one can send himself to sleep by force of will alone. When we go to bed, we are seldom so tired that we fall asleep from sheer exhaustion. Yet so soon as the healthy man, whose mind is at rest, finds himself between the sheets, he falls asleep almost with the force of an hypnotic suggestion. It is suggestion which acts, not will power. The attempt to substitute a voluntary effort for the forces of suggestion, which have acted on unnumbered nights and have produced the habit is, indeed, a chief cause of insomnia."

"Much of the common constipation of the nursery is due to the same cause. The excessive concentration of the nurse's thoughts on this daily question communicates itself to the child. The difficulty is emphasized, and again an attempt is made to substitute will power for forces of suggestion, which are at once inhibited by concentration of the mind upon the process."

The same forces are at work in the production of enuresis, or bed-wetting, although the matter is here often complicated by the development later on of a sense of shame and unhappiness in the child. The author thinks that, if we examine a large number of cases of bed-wetting in children, we can come to no other conclusion than that the cause of the trouble is due to just such a perversion of suggestion as has been considered above. The want of control is due to autosuggestion, dependent at the beginning on the unwise attitude adopted towards the fault by nurses and parents, and later kept up by the sense of shame and the mental distress involved. Any one of many devices may help in the hands of someone who is confident of his ability to cure the condition, and can communicate this confidence to the child. Carried out hopelessly and pessimistically by a tired and exasperated mother, they are well calculated to strengthen the hold which the obsession has on the child. In the treatment of enuresis, to be successful, the emphasis should be laid upon successes, not upon failures. He must be helped and encouraged to self-confidence, not rendered diffident or self-conscious. He should be told that the condition always gets well, and that it only goes on now because he is worried about it and keeps thinking of it. Sometimes the prescription of a rubber urinal, which the child can slip on at night, is directly curative; for in the older child it is chiefly worry that causes the trouble. To attempt directly to control disorders of conduct, such as have been considered, by medicines, is to attempt an impossible task.

A. J. Waring[5] emphasizes the necessity of overcoming the pavor medicus—fear of the doctor by pleasant and tactful management. The physician should have a pleasing address. His office should be permeated by an atmosphere of cheerfulness. Small white chairs, toys, potted plants and twittering birds would do much to help getting the "en rapport" with his little patient; on the other hand, instruments should not be visible, until the need for them arises.

[A volume might be written on the unwise management of children by their parents. Much of the fear of the doctor originates from the parents' attempt to frighten the child into good behavior by threatening to call the doctor. Much of the difficulty arising in the administration of medicine to children is due to such suggestion as "My child simply can not take medicine."—ED.]

The Psychology and Psychotherapy of the Nervous Housewife is admirably discussed by Abraham Myerson[6]. "The housewife whom I have in mind," says the author, "is poor though she has her counterpart in well-to-do households. Likewise she is "born in Russia," and a Jewess, yet has Gentile sisters, whose ancestors came over in the Mayflower."

"She passes from doctor to doctor, from clinic to clinic, looking for the aid she eloquently implores. By the time she is through one round of treatment she has probably had her eyes refracted, her septum straightened, her teeth pulled, had plates fitted to her feet, wears a pessary, or has had a ventral suspension, can tell sodium bromide in any mixture, has had a dozen negative Wassermann tests, as well as a course in electrohealing! It is easy to wax humorous about her, and to tell her 'now there is nothing the matter with you, go home and forget it,' but the cold fact remains that she breaks up nearly as many homes as alcohol, and is a 'focus of misery.' Her complaints simmer down to pains and aches, and paralgesic and paresthetic sensations, while fatigability enters into the syndrome as a sort of cement substance welding all the symptoms

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(5) Arch. Pediat., November, 1917.
(6) Critic and Guide, August, 1918.

together into a monument of misery. She is obsessed by anxiety and doubts. She is intensely hypochondriacal as a matter of course. As important as the fears and the doubts, is a mood made up of unenthusiasm. The patient drags herself through her work, looks to each day's work as a martyrdom, loses her pride in her skill as a housewife. Even her love for her children may sink to the point where their main relation to her emotions is the care, the distress, the irritation they bring her. It is characteristic of the condition that it is almost always very quickly improved by change of scene, *i. e.*, leaving the home; also that in many instances the pains and aches appear: first, after quarrels; secondly, in the midst of disagreeable tasks; and, thirdly, upon the occurrence of painful thoughts, such as the hypochondriacal fears, struggle against unfaithful thoughts, fear of pregnancy, in the midst of obsessive thoughts and doubts, etc. The author considers this neurosis the mark of a personality not willing to accept odious conditions of living, yet not strong enough to change them. He enumerates the factors in the development of the neurosis as follows:

1. The Monotony and Confining Nature of Housework. Where a woman has to do all of her own work, *i. e.*, the washing, ironing, scrubbing of floors, as well as cooking, cleaning and general household duties, she is doing far more than the average servant is willing to do. Add to this, that the work is lonely, also the petty irritation and the mental fatigue incident to the constant coping with the caprices of little children, and it is not surprising that they break down endurance and fortitude, especially in a woman who is aware of better conditions. Irregular habits of eating—largely because the appetite suffers (many a woman hates to eat what she herself cooks)—brings about constipation. There is a general atony developed through lack of recreation, lack of fresh air, and out-of-door exercise.

2. Effect of Poverty. Most women of this class have hopes, when they marry, for at least a moderate wealth. As time goes on and the husband still remains poor, she sees "a wall closing in," "a road

with old age and charity ahead,'' ''an ever enduring burden of hard work and no recreation,'' and an anxious rebellious spirit results.

3. Relation to the husband. In the married state, as it brings about a neurosis in certain housewives, there are several rifts within the lute. There may be conflict from the start as to who is to rule. As is universally known, the weapons of women in their battles with men are often indirect, and are wielded with a sense of winning through weakness, through ''bringing about an acute discomfort to the man, by appealing to his sense of shame and his ingrained dislike of tears, scenes, etc.'' So we have here a potent factor in the neurosis of the housewife—the will to victory or power through pain and suffering, *i. e.*, through the symptoms. Thus the headache, the backache, the fatigue are witnesses against the husband, a sort of ''see what you have done,'' a parade to be compared to the horrors that haunt the guilty; ''acute spurs to his conscience.''

Again, around the sex life itself a great deal of difficulty centers. There is a ground of discontent, if a disharmony exists between the partners in their needs and power. Wrapped up with this is the fear of pregnancy. These things snap the sexual link that unites the man and the woman, or rather wear it away. These things, and monotony, hard work, poverty, and a too earthly husband bring about a neurosis, one of whose chief symptoms, a deep fundamental symptom, is an inability to know how to act. They cannot accept nor can they reject their life conditions. This housewife, unsettled in her attitude toward her home and husband, wishing to do her duty, yet afflicted with distaste and fatigue, suffers. Her reaction in large part, at least, is the neurosis itself with its intermingled and interrelated physical and psychical manifestations. It is a disease of matrimony, which state, though excellent for the race, is rather hard on many individuals.

The author makes these suggestions as to therapy, ''A detailed understanding of the home is of value, and social service has a very proper, non-charity field in introducing better housekeeping, labor-saving devices, new interests, etc. Removal to another neighborhood sometimes acts as a tonic. If the home can be changed, there is the keynote of therapeutics, if not, then it is better to lay emphasis elsewhere since a counsel of impossibilities only depresses. One must then raise the mood of the patient by physical agencies, *i. e.*, by drugs, hydrotherapy, massage, rest, etc. But above all, it is very valuable slowly and carefully to adjust the patient to her home as it is, to purge her of useless rebellion, and vain aspirations. Here a knowledge of the patient is the first essential, and individual psychotherapeutics indispensable. Sometimes the greatest good is done by a simple straightforward talk with the husband."

Psychotherapy of the Menopause. Frank P. Norbury and Albert H. Dollear,[7] while admitting the importance of the disturbance in the hormone equilibrium at this period and the therapeutic value of organotherapy, emphasize the psychic features in the etiology of the condition, which must be recognized to make therapy successful.

Regarding organotherapy, they say: "At the menopause, when the diminishing or absent ovarian secretion begins to be noted, there may occur mental disorder, especially when there is associated hypo-thyroidism. Here is where thyroid extract with whole ovarian extract have proven beneficial; ovarian extract alone is useless, and apparently indicates the dependent association for the thyroid with the ovarian secretion and accounts for the mental lethargy, even stupor, which is so common in involutionary mental states."

Regarding the psychic condition, the authors point out that the period of aging brings forth a feeling of inferiority, especially to those neurotically constituted. These depressions are accentuated at the menopause by episodes in the home life, like the death of the husband, a business failure, a breaking up of the family, a marriage of a daughter or a son, the going of a son to war service, a loss of position, or loss of a post of honor, etc. Renunciation would be easier if, along with the sinking of the bodily and mental power, there would also take place a narrowing of the emotional life. This seldom happens; and, in order to find a substitute for

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(7) Ill. Med. Jour., August, 1918.

the loss, the aggressive tendency, which has been stimulated by the insecurity, again whips up all stimuli of desire. The guilding principle becomes "I am deprived," "I have had little out of life," "I am a slave to my home, my family," etc. These patients accentuate this view to such an extent that they, suspicious and distrustful, sink into a repulsive egoism that makes them anti-social, narrows quite rapidly their social sphere, and makes the woman a vacillating, dissatisfied, unhappy, unstable person, at outs with herself, with the world, and everybody in it. Psychologically these complaints—this anti-social attitude—is a revolt, a protest against their inferiority and a selfish defense reaction to soften the protests of others, especially the members of their family. The woman is, in her own mind, a martyr, and her endeavor is to make everyone else acknowledge her right to be so recognized.

"Readjustments of, and insight into these mental processes and mechanisms, become imperative if we are to give relief to the patient. Treatment of the neurosis of the menopause, while trying and consuming time and patience of all concerned, yields results if we are dealing with a patient who wants to get well. With many patients of the "satisfied with self" type, who have come to the physician as another experiment, after all other resources have failed to restore them, it is to be noted, that even a slight improvement not infrequently contributes to a relapse, because such patients resent the authority of physician and nurse. The relapse is a protest against authority, for never in their experience were they able to adjust or subordinate themselves to anyone." "These defense reactions are in line with the guiding principle of their lives, the assurance of dominance. Woe be unto the self-confident physician who approaches such a case with his own desire to dominate and who, by brow-beating, thinks he has scored a victory over such a case. Just let him wait until his patient has marshalled her forces, brought up her reserves, and laid down her barrage. He will find she understands camouflage and he will retire defeated, a sadder and perhaps a wiser physician." "It requires tact and patience to grasp the point of view of the patient; and, in order to meet it, the organization of service and supervision of the patient must be in readiness, with the relatives lined up with the physician in the campaign. It is not to be a tentative experimentation; it is to be a siege, for the purpose of overcoming the tyrannical power of the patient over herself and her family. Systematized rest is the sovereign aid in this campaign, and intelligent study 'to make what is helpful pleasant, and what is pleasant helpful.' What we should seek is to enable the mind of the woman to revert to the more neutral type, which is normality for the post-menopause period."

[One important item of treatment that, in the Editor's opinion, has not been sufficiently emphasized by the authors is, what might be called, "substitution therapy," this craving for a sphere of useful activity and of authority should be gratified by club work, charitable or social service, or in any other way possible.—Ed.]

A Psychic Hypnotic. James F. Morton[8] writes: "The simple withdrawal of the mind from active exertion sounds more easy than it really is. The tendency to think is extremely pertinacious. Many persons do not know how to relax. Tell them to do so; and they immediately set up the idea of relaxation as a new goal of mental exertion, and strain to attain it. The very effort defeats its own ends."

"What is needed, may be described as building a bridge from the waking to the sleeping consciousness. The plan which I have adopted when I find mental activity persisting and keeping me wakeful is to allow the activity to go on without resistance, but to change its direction from the world of real problems to the world of unrealities; to let the imagination have free course; to give free rein to the forming of ideal pictures; to make myself the hero of the wildest and most impossible (but not over exciting) achievements; to act out subjectively a story of the fullest realization of my most extreme aspirations or desires; to fashion a pleasing and mildly exhilarating waking dream; to throw the balancing and reasoning processes of the mind far into the background until they became entirely

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(8) Critic and Guide, November, 1917.

quiescent. This method has been found to work times out of number."

CLIMATOTHERAPY.

Hay-Fever Resorts in the United States and Canada. William Scheppegrell[9] points out that the important thing regarding a hay-fever resort is that all weeds and grasses with wind-borne pollen be rigidly excluded.

"There are a number of places in the United States and Canada in which the meteorological or topographic condition prevents the growth of the plants that cause hay-fever, and which may therefore be termed natural hay-fever resorts. There are several varieties of hay-fever, however; and, accordingly, there are some localities in which one class of hay-fever sufferers find relief but in which others are not benefited. A patient from Illinois, sensitive to the common ragweed (*Ambrosia elatior*) hay-fever only, would find relief in California, where this is not found; and a subject in California, sensitive to the sagebrush (*Artemisia*) only, would be relieved in Illinois."

Altitude is no protection against hay-fever unless this exceeds 6,000 feet. An island that is kept free of weeds, and has no land nearer than 5 miles, is practically free of hay-fever pollen, and is therefore without hay-fever. There are a number of places in the United States and Canada, where, on account of the altitude (over 6,000 feet), latitude or the presence of extensive forests, the common hay-fever weeds are not found, and which are therefore free of hay-fever. For a list of such places the reader must be referred to the original article.

HYDROTHERAPY.

Reduction of Temperature by Local Ice-Bags. M. G. Dobbyn[10] recommends that we attack the blood-stream in the great vessels at the points where they are sub-

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(9) Jour. Amer. Med. Ass'n., Aug. 17, 1918; also this Volume, p. 334.

(10) Brit. Med. Jour., July 27, 1918.

cutaneous, or nearly so. For this purpose a number of bags are filled with crushed ice. Such bags can be readily improvised from discarded rubber gloves and the like.

[Sections of discarded automobile tires have been advocated.—Ed.]

The sites attacked are the neck, the axilla, Scarpa's triangle, and the popliteal spaces. The author claims that a reduction of 3° in a quarter of an hour is obtained, and cold sponging and other cumbersome methods are obviated. This method should prove especially useful to army surgeons.

The Correct Shower Bath is described by Simon Baruch[1] as the oblique shower head (at an angle 45°): "There is no doubt," says Baruch, "in the minds of those who have given this subject any thought that, while the vertical shower may serve equally well for cleansing, it fails in the equally if not more important object of the shower, to furnish the refreshment and invigoration produced by the forcible impact of water on the skin nerves, vessels and muscular structures. Since the latter depends on the force or pressure under which the water is delivered, it is obvious that this beneficient action is precluded because of the fact that, no matter how strong the pressure, the water falls with force only on the hairy scalps, from which it trickles on the body. The oblique shower, on the contrary, strikes the back, chest or sides, avoiding the head unless the head is intentionally exposed for cleansing."

"The great enhancement of efficiency among our industrial workers and our soldiers derivable from the correctly constructed shower cannot at this time be too much emphasized or too quickly brought to the attention of the authorities."

ELECTROTHERAPY.

Clinical Results from Iontophoresis. Leighton Kesteven[2] agrees with Lewis Jones, who in the preface to

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(1) Letter to the Editor, Jour. Amer. Med. Ass'n., July 13, 1918.
(2) Brit. Med. Jour., Sept. 29, 1917.

his little book on ionic medication, laid it down that we need not greatly concern ourselves as to whether there is effective penetration of ions or not, but that the procedures described have been followed by results of value. The great value of ionization lies in its sclerolytic effect. To obtain such an effect in the ear, the proper method is to lay the patient's head sideways on the table, and to fill the external meatus with the solution employed, then the current is passed through it, thus ensuring a constant supply of the required ions. A small probe insulated to its tip will carry the current into the solution. The author's favorite remedy seems to be zinc iodide. Great relief may be obtained he says in all classes of middle ear catarrh in this way by the use of a solution of zinc iodide (30 per cent.) with 3 to 4 milliamperes of current. Iodine being an anion and zinc a cation the current must occasionally be reversed to get the benefit of both the elements, removing the anode during the reversal to avoid the shock. In acute cases the current may be kept on for five to ten minutes, in chronic for twenty.

The relief of pain in the acute cases is very marked after the current has run for a few minutes. In the functional deafness caused often by nerve exhaustion, the result of mental trouble, ionization gives much relief, acting in some cases like magic. In purulent otorrhea, germicidal action is manifested by the rapid diminution of the leukocytes under ionization by zinc iodide. If pain is at any time urgent, immediate relief can be given by ionization with cocaine.

In acute tonsillitis, the author uses a curved aluminum probe insulated to within half an inch of its end, round which cotton-wool is wound and dipped frequently in 5 per cent. zinc iodide solution, and passes a 15 to 20 milliampère current through the tonsil for five to ten minutes. Relief from pain is speedy, and the tumefaction subsides rapidly. In chronic indurated cases longer treatment is called for, say eight or ten times on alternate days with a 10 per cent. solution. The negative current should be passed through the probe, as iodine is an anion, and a padded cathode placed at the back of the neck.

Enlargement of the turbinates can be reduced by zinc iodide; but, owing to the more sensitive nature of the nasal membrane, only 2 per cent. solution should be used. About two or three minutes at a time is all that should be given, and a phenol powder should be blown in afterwards to allay any smarting. The Eustachian tube can be ionized with a Eustachian catheter perforated at the sides for the last quarter-inch, and closed at the end. This is connected to a fine tube holding the ionizing fluid, with a fine wire in it to carry the requisite 3 milliampère current.

Enlarged prostate can be treated with success by this method. Symptoms which make life a misery are relieved without risk to life.

"Either aluminum or copper wire an eighth of an inch thick can be used for the probe electrodes. An easy way of insulating them is to dip them into a saturated solution of celluloid in acetone. The points can then be scraped bare with the knife for the cotton-wool at the ends. The celluloid will not bear boiling, but can be sterilized with 30 per cent. carbolic solution."

Preventive Medicine

EDITED BY

WILLIAM A. EVANS, M.S., M.D., LL.D., D.P.H.

INTRODUCTION.

Just how well preventive medicine is capable of doing is best shown by the health of the Army and Navy. The men in those organizations are compelled to follow orders, whereas the civilian has the option of obeying or disregarding established health procedures as he wishes. He proceeds upon the theory that if he chooses to follow a course which leads to ill health it is his own affair.

We read of weekly death-rates in the Army of 1.8 and not infrequently of a rate of 2 as compared with civilian rates of 14 for the entire population and 6.8 for the male population from 21 to 31 years of age. That the Army is healthy is shown not only by the death-rate but also by the non-effective rates. A non-effective rate which occasionally reaches 14 for certain camps is so low as to seem impossible of accomplishment.

As we freely predicted last year, the Army and Navy have suffered from no disease which could be vaccinated against. As was also freely predicted there has been practically no sick rate from those diseases which result from bad sanitation, meaning, thereby, polluted water and milk, poor food, garbage and other refuse improperly disposed of, camp and bodily uncleanliness. The sanitarians, sanitary engineers and food-control branches of the service have demonstrated their capabilities.

In my presidential address to the American Public Health Association[1] in 1917, while predicting that the diseases in the above groups would cause the military forces little trouble, I warned them against measles, mumps, meningitis, pneumonia, colds and venereal diseases. The winter of 1917-18 verified the accuracy of the prediction. Vaughan thinks that some of the mistakes of last winter will not be repeated. If the Army succeeds in mastering the pneumonia problem the civilian communities can not long justify themselves in disregarding it. It seems probable that some headway has been made. The authorities are swinging rather defi-

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(1) Amer. Jour. Pub. Health, November, 1917.

nitely toward vaccination. So far as the pneumonias of last winter were concerned the streptococci seemed to be more important as causative agents than the pneumococci. If this experience should be duplicated not only would the treatment of pneumonia undergo some changes but the method of prevention might likewise be changed. It has already been proposed that steptococcus carriers be controlled but just how this could be done in view of the almost universal prevalence of streptococci in the mouth and in the lower alimentary tract is a question.

One of the gains of the year has been the prevention of contact infection through the use of masks. In the address referred to, the relation of the civilian health officer to the spread of forms of contagion in training camps was mentioned. There is no evidence that civilian authorities have made increased efforts to control measles, mumps, meningitis, pneumonia and colds. They have made considerable headway in controlling venereal disease.

The venereal disease rate of the national army cantonments was 288 last October; by January this rate had fallen to 70. There are unofficial statements that certain commands have rates as low as 4.0.

The authorities recognizing the relation of venereal diseases in civilian life to their prevalence in the Army are insisting that something be done about it and something is being done. Many of the state boards of health now have more money for the control of venereal diseases than for any other purpose. For the first time, municipal governments are equipping themselves with hospitals and dispensaries for venereal diseases. It is to be hoped that the same considerations responsible for this growth of a health department activity may result in civilian efforts to control measles, pneumonia, meningitis and colds.

The government has been forced to enter on a very extensive housing program. The authorities have had the wisdom to build these new houses along improved health lines. These government housing schemes have been scattered widely throughout the union. Few states are without a group of government built houses, and the effect of these groups on building codes is bound to be great. Industrial plants and individual builders can not well escape their influence.

When the war was precipitated on Great Britain, laborers engaged in the war industries suffered greatly. There were many cases of T. N. T. poisoning and of other industrial poisonings. This menace they have mastered and we, coming later in the field, have escaped it almost altogether. The series of British Health of Munitions Workers' Reports are well worthy of study. Those on fatigue and hours of labor are quite as valuable as those on trade poisons. The Labor Section of the Advisory Commission, Council of National Defense, appointed a committee on sanitation in 1917. This committee appointed about a dozen committees each to deal with some one subject engaged in industry. These committees have reported and three of the reports have been issued. Standards can not well be abstracted. I have not been able to make use of much of these reports in the text of his book. They are worthy of study. The reports that have been issued are:

No. 1, Industrial Fatigue. No. 2, Manufacture and Loading of High Explosives. No. 3, Code of Lighting for Factories, Mills and other Work Places.

Report No. 2 was adopted by the manufacturers of munitions who agreed to abide by it. Industrial hygiene has already had a healthy stimulus from the conditions created by war. It will continue to grow. In the presidential address already referred to I said: "I do not think it requires much vision to see that out of this war will come a great increase in public health work. Preventive medicine is justifying itself and will continue to do so. Civil communities will not be slow to apply the lessons of war to the solution of the problems concerned in the welfare of their own people." Health work has been somewhat crippled by the transfer of many hygienists and sanitarians to the Army and Navy. Before long these men will be coming back richly equipped with military experience. When that day comes preventive medicine now progressing slowly will undergo great and rapid development.

W. A. EVANS.

MEDICAL SOCIOLOGY.

Relation of the Birth-Rate to National Life. Just how important a high birth-rate is few people understand. Ordinarily, we think of the old high birth-rates and high death-rates as going hand in hand and in our efforts to lower the latter we have tacitly assumed that it was proper for the former to fall, also. Students of demography who are also students of world affairs tell us that the horrors of this world war might never have occurred had certain of the nations of western Europe maintained their birth-rates.

The Declining Birth-Rate. L. Q. Dublin,[2] in a discussion of the trend of population in several of the countries at war and the necessity of education and moral resolve as a remedy for some obviously destructive tendencies, says that at the beginning of the nineteenth century France had a population of 29 millions, Germany (the states at present in the German Empire) 23 millions and the United Kingdom, 18 millions. A century later Germany had 65 millions, the United Kingdom, 45 millions, and France, 39 millions. In 1860 France was still in the lead with a population of 27 millions. In the next fifty years its population increased only 2 millions. In the same time that of the German Empire almost doubled. In 1811, the population of France constituted 16 per cent. of the population of Europe. In 1911, it constituted only 9 per cent. In 1830 the birth-rate of France was 30. In 1914 it was 18. The death-rate in 1914 was 19.6. The birth-rate of Germany continued over 30 until 1909. That of the United Kingdom was over 30 until 1895.

The present power of Germany and weakness of France are the results in great measure of the differing birth-rates of the two countries.

An invariable consequence of a declining birth-rate continued for a term of years in a reduction of the pro-

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(2) Amer. Ass'n., Advan. Sci., Dec. 29, 1917.

portion of the young and an undue proportion of the old and dependents.

The reduction in the birth-rate of France acts as it acts elsewhere in a selective fashion. The principal reduction is in those groups best able to bear and to raise a large family to maturity. A low birth-rate in the economically-most-fit groups means always a decline in constructive effort for national development. In 1913 Great Britain had a death-rate of 14 while France had one of 18. France is without a definite health program. This is a part of the evidence that France is deficient in men of progressive constructive ability. The men are not there because they were not born.

Great Britain is following in the footsteps of France though nearly a half century behind. Germany is following also, but she is about twenty years behind Britain. In each case the decline in the birth-rate has been because of conscious limitation of the family.

The reason for stating these disconcerting facts is that the United States is headed in the same direction. In the United States the birth-rate is about 25, the death-rate about 15 and the yearly increase of population through excess of births over deaths is about 1 per cent. The excess of births over deaths, however, lies among the foreign born. In 1870, the native whites of native parentage formed 67.8 per cent. of the population; in 1910 it was 60.5 per cent. In the New England states the percentage as aforesaid decreased from 52.3 in 1890 to 40.3 in 1910. In the middle Atlantic states from 51.8 to 44.8. The decline in the birth-rate is so marked that Professor Willcox says that if it is continued for 100 years no children at all will be born at the end of that time. In 1910 in Massachusetts, the native white stock had a birth-rate of 14.9; the foreign-born, one of 49.1. In the same year the death-rate of the first group was 16.3 and that of the second was 15.4. The native stock is declining nearly 0.1 per cent. a year through excess of deaths over births; the foreign born stock is increasing 3.4 per cent. a year through excess of births over deaths.

There must be almost four children to each family in order that a stock shall be maintained. A large part of the native stock is not having four-children families.

The remedy lies in "a birth release among the normal and healthy people as a primary national duty." Such release must be conscious and deliberate, the act of will of free individuals who thus express a highly moral purpose. This end can be forwarded (1) by appeals to patriotism, constant and persisting, (2) by education of women in motherhood, (3) by making a large family a badge of honor, (4) by fostering the home and the family, (5) by making large families of economic advantage through exempting them from certain taxes and placing taxes on individuals without families.

Comparative Demography of Minnesota. F. L. Adair[3] argues along the same lines as Dublin does and comes to the same conclusion. He says that the excess of foreign-borns over natives in Minnesota is 40 per cent., while in Connecticut it is 300 per cent. In Minnesota one birth in 20 is a stillbirth. Out of each ten babies born alive one dies before reaching one year of age. Out of each five babies born one dies before reaching the age of 15.

Average Number of Children to Each Woman.
——— 1st generation — — — — — 2nd generation

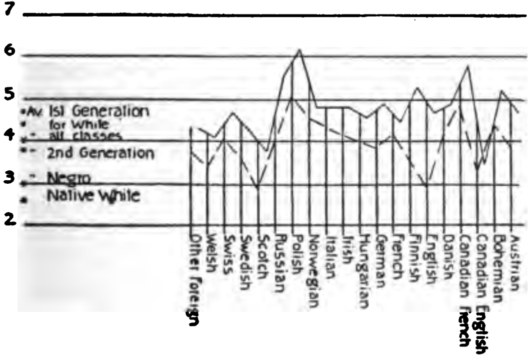

Fig. 1.

The average age of half the persons marrying is more than 25, at which time between one-fifth and one-fourth of those born have died.

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(3) Journal-Lancet, Dec. 15, 1917.

The percentage of sterility is over 13 for whites and 20.5 for negroes.

The excess of births over deaths is 1.44 per cent. in Minnesota, the state in the registration-for-births area with the greatest excess and is 0.55 per cent. for Maine, the state with the lowest excess. The negro birth-rate is 20.6 and death-rate is 22.9 per 1,000.

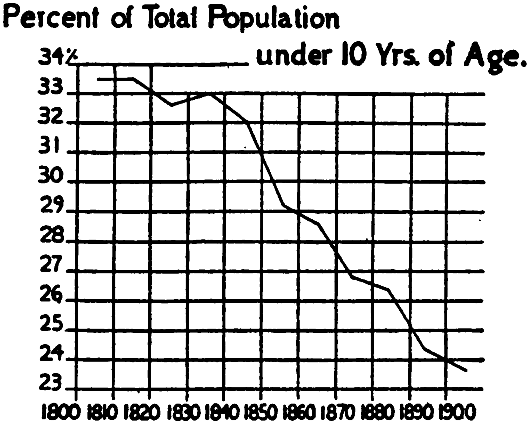
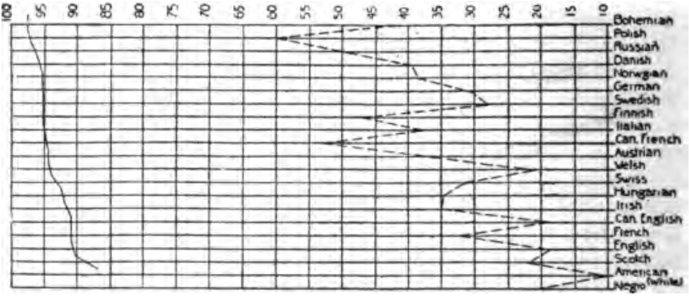


Fig. 2.



Solid line indicates per cent. having offspring: broken line, per cent. having more than five children.

Fig. 3.

In Germany in 1906 the increase of population through excess of births over deaths was 1.49 per cent.;

in 1911 it was 1.35 per cent. Kuczynski says that the birth-rate of Berlin, 1891 to 1895, was not high enough to maintain the population, but the showing made by the native stock in Massachusetts was even worse. The birth-rates of certain European countries just before the war were: England and Wales, 24.1 (1913); Switzerland, 23.1 (1913); Belgium, 22.6 (1912); France, 19 (1912).

Falling Birth-Rate. R. J. A. Berry[4] agrees with Karl Pearson that if the tendency toward the limitation of families continues unchecked for another forty years it means national disaster, complete and irremediable, not only for this country but for Great Britain across four seas. The birth-rate of Edinburgh fell 50 per cent. in 40 years. The birth-rate of England and Wales at its highest point, 36.3 in 1876, has reached 19.5 by 1916. The decline has been especially noticeable among the well-to-do.

Effect of This War on Populations. S. M. Hamill[5] says that had England had so low a death-rate for the last forty years as she had in 1914 she would have had 1,300,000 more men available for military service. Had England's birth-rate of forty years ago been maintained it would have meant another 1,300,000 of military age.

Coincident with the onset of war there began: (1) A decreasing birth-rate; (2) an increasing death-rate; (3) an appalling destruction of adult life on the field of battle; (4) a great maiming of men, thousands of whom are totally incapacitated.

To offset these losses the warring countries are bending their energies to save men. In 1916 the German birth-rate was 40 per cent. less than normal and the infant mortality was higher than normal. In France there is only one physician to 8,000 people. In 1913 the birth-rate of France was 18.8. In 1916 it was 8.6. It is estimated that the population of France decreased 790,000 in 1917. In 1916 the decrease was 788,000.

In Great Britain the infant mortality rate was 105 in 1914, 110 in 1915, but it was held down to 91 to 1916. The answer to the question who has won this war will be given twenty or thirty years from today. Naturally it will be the country that so maintains the nutrition of its people as to yield the highest degree of efficiency and most nearly maintains its rate of increase of population.

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(4) Med. Jour. Austral., Dec. 15, 1917.
(5) Amer. Jour. Med. Sci., January, 1918.

Sir Bernard Mallet[6], speaking on the effect of the first three years of the war on the population of Great Britain, said:

1. Births in the United Kingdom have exceeded deaths, including those in the field. There has been a considerable net addition to the population. In the Central Empire, on the other hand, the total population has decreased by about 4,000,000, the decline in the birth-rate being about double that of England and Wales.

2. The war has had no appreciable effect on the number of illegitimate births in Great Britain.

3. The infant mortality rate has fallen in the United Kingdom and also in Germany, but the rate of the latter country remains much higher than that of the former.

Effect of War on Nourishment of Children. S. Josephine Baker[7] says that since the war began the United Kingdom has lost 500,000 potential lives through fall in the birth-rate. Germany has lost 2,600,000 and Hungary 1,500,000 through the same cause.

In 1915 only 365 out of 11,000 applicants were accepted by the medical examiners for the Marine Corps. The report of the Surgeon-General for 1916 shows that of 278,537 applicants for the Army between 1914 and 1917, 205,281 or 73.3 per cent. were rejected by the examining surgeons because of physical defects. At the recruiting depots another 3.6 per cent. were rejected. The advance reports indicate that between 40 and 50 per cent. of the draft have been rejected for physical defects. From 60 to 70 per cent. of these were rejected for defects due to preventable disease; 16 per cent. were rejected because of being undernourished or underdeveloped. In the cities, school medical inspection has materially improved matters, but not so in rural districts and in the smaller cities. The city boy passes a

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6) Eugenics Rev., January, 1918.
(7) New York Med. Jour., Feb. 16, 1918.

better physical examination into the Army and stands up better under Army trials than the country boys do.

Dr. Baker quotes a German official as saying in a newspaper that the war has caused a decrease in the average height of German children of one and one-fifth inches and an average loss of weight of 4.62 pounds. This applies especially to children of from 12 to 15 years of age.

In France and Belgium it has been noted that the undernourishment of school children, the result of the war, results not only in undersize but in an increased incidence of tuberculosis.

The undernourishment is getting worse in New York City.

By the Dumferline classification children are graded into: (1) Normally healthy or excellent; (2) passable; (3) needing careful supervision; (4) needing medical care. Of one million school children 280,000 were in Class 1, 600,000 in Class 2; 90,000 were in Class 3, and 30,000 were in Class 4.

Wages have not gone up as fast as the cost of living during the last several years. This is responsible for the increase in undernourishment of school children. The energy created by the war demands increased attention to those matters which conserve not only infant life but all child life.

Emigration and the Irish Mortality Rate. Thompson[8] finds that the emigration from Ireland to the United States has operated during the past fifty years to raise the death-rate of that country. Unless it has operated to reduce the death-rate in this country there has been a net loss to the world. Nearly three million have emigrated to the states, the great majority of whom were persons between 15 and 35 years of age, "whom we might describe as the flower of the population of rural Ireland;" 47 per cent. of the emigrants were females.

The mortality rate rose from 1866-70 (16.44) to 1891-5 (18.50) since which time it has fallen somewhat to the level of 1911-15 (16.78). The improvement now seems steady. In the same period (1866 to 1916) the

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(8) Dublin Jour. Med. Sci., February, 1918.

mortality rate for England and Wales fell from 22.42 to 14.27 and for Scotland from 21.97 to 15.67.

In fifty years the contagion rate in Ireland fell from 272 to 112 per 100,000. They now have, and they always have had, less contagion than Scotland, England or Wales. The typhoid fever rate of Ireland has fallen from 18 to 6, that of Scotland from 42 to 5 and that of England and Wales from 37 to 5. Since 1875 there has been practically no smallpox in Ireland and no patient with this disease has died there since 1907. While the consumption rate of Ireland is falling it is still high. It was at its maximum in 1896-1900 with 282. In 1911-15 it was 215. The Scotch maximum was 382 in 1866-70 and the rate was 169 in 1911-15. The English maximum was 320 in 1866-70 and the rate was 141 in 1911-15. The death-rate of mothers from childbearing was at its maximum in Ireland in 1866-70, 7.1. It was 5.2 in 1911-15. England's rate fell from 5.5 in 1891-5 to 4 in 1911-15, while Scotland's is remaining stationary around 5.8. The condition of babies in Ireland is good, but it is not improving much. The worst rate, 106, was that of 1896-1900; the best, 91, was that of 1911-15.

In comparison, England's rate of 157 in 1866-70 has fallen to 110 in 1911-15 and Scotland's 122 in 1866-70 to 113 in 1911-15. Had they not lost so heavily of young men and women through emigration, Ireland's mortality statistics would have compared very favorably with those of Scotland, England and Wales.

Conservation of Man Power in Canada. P. H. Bryce[9] thinks that the conservation of child life and saving in lives of older people and the decrease of sickness are of importance equal to immigration and high birth-rate in maintaining the man power of a country. The birth-rate of the different provinces is: Ontario, 24.2; Nova Scotia, 25.1; Manitoba, 30.4; Quebec, 37.9. The death-rates are: Manitoba, 10.1; Ontario, 12; Nova Scotia, 16; Quebec, 16.5.

The deaths under 1 year of age per 1,000 births are: Ontario, 102; Manitoba, 105; Nova Scotia, 125; Quebec, 147. The increase of population due to excess of births over deaths is about 1.5 per cent. a year.

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(9) Com. on Conservation, 1918.

In the twenty years between 1881 and 1901 the increase of population in Canada was 2,750,000, less than a 1.5 per cent. yearly increase, and this in spite of an immigration of 715,000. The constructive loss was almost a million. A part of this loss was due to emigration and a part to an unnecessarily heavy death-rate.

Among immigrants, the percentage of children under 14 years of age is only about 20, as compared with 34, the normal. This changes the normal death-rates both of the region emigrated from and that migrated to. Migration from an area likewise lowers its birth-rate. Since the population under 1 year of age varies from 2.5 to 3.2 per cent. of the total population and that of 0-4 years of age varies from 10.40 to 14.50, obviously the most effective method of saving population is to reduce baby deaths. That such reduction is possible is shown by the following: Montreal, 1912, 200; 1916, 196; Toronto, 1912, 144; 1916, 93; Winnipeg, 1912, 199.5; 1916, 117. The reduction of deaths-due-to from various forms of contagion is likewise very striking. The need for conserving lives especially as a result of this terrible war suggests either health insurance or a national department of health, to Dr. Bryce. Of the $4,000,000 expended on institutions for caring for the sick of one sort or another, 60 per cent. comes from public funds. It would be wiser to spend for prevention. The British Medical Association, at first so violently opposed to compulsory health insurance, is now in favor of it with a "degree of unaminity that is somewhat remarkable," to quote the *British Medical Journal*. Dr. Bryce quotes a petition recently signed by 1,100 medical officers of health petitioning the Imperial House of Commons to establish a Ministry of Health.

Effect of War on Stature. H. H. O'Farrell[1] has run to earth the widely accepted statement that the average height of the French population fell off by one or two inches as the result of the Napoleonic wars. He found its origin in most inaccurate and unreliable statements made by Sir Archibald Alison in his "History of Europe." O'Farrell said that Alison's name is a byword for inaccuracy and, in this instance, he has not belied his

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(1) Eugenics Rev., October, 1917.

reputation for blundering. The basis for his conclusions were two tables which appeared in D'Angeville's "Essay on the Statistics of the French Population," but these quotations were inaccurately made and his conclusions were not only not justified by the facts but D'Angeville specially warned against conclusions of this nature.

The height of conscripts in 1810 was not so great as that of 1804, but the difference was due to the greater age of the 1804 conscripts and the section of France from which most of the 1810 recruits were drawn. The 1810 recruits were 18 years of age, whereas the 1804 recruits ranged from 20 years and 3 months to 21 years and 3 months.

D'Angeville says that these figures seem to show that the proper age for military service is not less than the full 20 years.

A considerable part of the 1810 draft came from the mountainous section of France "where the population attain its full stature only slowly." Although the chapter from which Alison quoted dealt with other subjects and only referred to stature of soldiers incidentally, there is a chapter in D'Angeville dealing with stature from which Alison did not quote. O'Farrell thinks that Alison could not have read all of the work from which he quoted as a basis for the statements which have become so world wide in their acceptance.

The standard for a recruit was 1,570 meters in 1818. In 1830 it was 1,540. However, a far more accurate figure for such comparisons as Alison suggested is the average height of the recruit accepted. For the five years—1825 to 1829—this was 1,656 meters and for the years 1830 to 1833 inclusive it was 1,653—a difference of less than one-eighth of an inch.

As already noted, D'Angeville attributed the differences to the different minimum ages of the drafts and to the different sections of France from which most of the man came. This latter difference he attributed largely to the different distributions of the population between the cities and the rural districts and to the different foods used in the different regions. With the last conclusion O'Farrell does not agree. He says

France was populated by Nordics, tall and blonde; Mediterraneans, short and dark, and Alpines or Celts, stocky and intermediate in coloring, and that the difference in stature of the recruits depended largely upon whether they were drawn in preponderating numbers from one or another of these stocks.

[I hope the article by O'Farrell may be given wide publicity. The statement that the Napoleonic wars decreased the average stature of Frenchmen has been accepted without question. The number of inches of the diminution has increased gradually with the telling from 1 to 4. The question needs reopening. It also needs careful study. The French Revolution began in 1789. For many years the internal troubles of France far overshadowed the operations against enemies from without. It is probable that 90 per cent. of the army of 1810 was born during a period when war was not disturbing the life of France. In fact, even the revolution was not affecting life materially outside of Paris. Napoleon's star was in the ascendant by 1799. From that time to 1815 the internal discussions were of minor consequence, but a considerable part of the man power was in the army and much of it was out of the country. However, not even in the Napoleonic wars were the proportions of total population then under arms more than a fraction of the proportions at present withdrawn from our populations. In D'Angeville's text we read of drafts of 60,000 and 80,000 as contrasted with drafts of millions today. The recruits of 1825 to 1829 were born in the mid-period of Napoleon's reign. Those of 1830-33 toward its close. A comparison of the size of recruits in 1910 with those of 1736 would be interesting and valuable.—Ed.]

Improving Physical Vigor. Sir William Milligan[2] makes the following suggestions for improving the physical vigor of the British people:

1. Establishment of a central anthropometric bureau to weigh and measure the youth of the country.
2. Compulsory drill for two hours a week in all primary and secondary schools, public schools and universities.

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(2) Jour. State Med., February, 1918.

3. Provision by public authorities of open space for drill grounds and playgrounds.

4. Provision of competent instructors, male and female.

All of this program except that relating to the Bureau constitutes a part of the political program of the British labor party.

Truby King[3] says that the New Zealand Society for the Health of Women and Children is more interested in improving the health of the people than it is in lessening the baby death-rate. They are more interested in establishing the all-around fitness of the 24,000 to 25,000 new arrivals than they are in reducing the baby deaths from 2,000 to 1,000, and yet in doing the first work they inevitably care for the second.

The essentials of the New Zealand work are:

1. Establishment of high standards of living, of baby care and of security of life for babies.
2. Education.
3. Securing wide interest in baby and child welfare.
4. Breast feeding.
5. Good obstetrical service—in hospitals wherever possible.
6. Good nursing service, especially good district nursing service.
7. Complete registration of births.
8. Avoidance of coddling.

Dr. King thinks that young babies should be fed every three hours; older ones every four hours; and night feeding should be abandoned as early as possible.

Suggestion for the 1920 Census. W. H. Guilfoy and E. W. Kopf[4], as chairman and secretary of a committee of the American Public Health Association, make many valuable suggestions as to the scope of the 1920 census. They argue that the time has come to embody enough data for a true science of demology in our census reports. This will necessitate inquiry into many subjects not touched on in previous reports. There should be statistics of births. These statistics should show the fecundity of different racial groups, of the city com-

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(3) Edinburgh Med. Jour., December, 1917.
(4) New York Med. Jour., Oct. 6, 1917.

pared with the country, of persons of different ages and of different earning capacities.

The influence of a check on births should be inquired into; and also questions relating to illegitimacy.

There should be sickness disability statistics as to all forms of illness as well as to the small group of communicable diseases. Institutional sickness and mortality should be reported on standard forms and in conformity with fixed standards in other directions.

The maternity death-rate and the death-rate among babies less than one month old should be inquired into and analyzed.

The vital statistics of insurance companies and of states operating compensation laws should be made available.

The effects of migrations of population into the country and from one part of the country to another should be inquired into.

The committee suggests that the tendency toward a higher death-rate among people past middle life will be explained by "an extended consideration of the race or nationality characteristics of the population." The experiences of the draft examiners should be used to revise our standards. And finally they suggest that logarithms and formulas be used to check on field reports as is done in some European countries.

SANITATION.

Effect of a Low Typhoid Rate. E. B. Fink[5] as the result of a comparative statistical study of American cities is not disposed to accept the Mills-Reincke phenomenon nor the Hazen theorem. In 1893 Mills noted that coincident with a sudden decrease in the typhoid death-rate as a result of substituting pure for polluted water there was a reduction of the general mortality rate. About the same time, Reincke of Hamburg called attention to the fact that the reduction in the death-rate of Hamburg was greater than could be explained by the reduction in the typhoid rate. Sedgwick and

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(5) Jour. Infect. Dis., July, 1917.

McNutt applied to this reduction in the general death-rate coincident with an improvement in the water-supply the term—Mills-Reincke phenomenon.

In 1905 Hazen said: Where one death from typhoid fever has been avoided by the use of a better water, a certain number of deaths, probably two or three, from other causes have been avoided. This is commonly known as Hazen's theorem.

There has never been any satisfactory explanation of the reason for the great improvement, if there be any. Dr. F. Dublin's study of the causes of death of persons who had recovered from typhoid showed that within the first year the death-rate among them was three times the expected and during the second year it was double. Of the deaths, 38.9 per cent. were due to tuberculosis 14.8 per cent. to heart disease, 7.4 per cent. to pneumonia and 7.5 per cent. to nephritis. It is evident that typhoid lowers bodily vigor and thus predisposes to infection. This is about as logical an explanation as has been offered, but it is scarcely far-reaching enough.

Another explanation is that the change to a non-polluted water supply eliminates that part of the diarrhea death-rate due to water and even lessens that due to milk.

A third explanation is that in eliminating typhoid or greatly lessening it the deaths from typhoid formerly reported as due to other causes are lessened. In Fink's study of a group of cities that had rather suddenly changed their water from a polluted to a non-polluted water supply there were some that had a decrease in the general death-rate, some that had an increase and some where the rate remained stationary. The Hazen theorem does not always apply. He says: "There can be no doubt that an impure water supply may be, and in general is, accompanied by a high general death-rate. Because of the multiplicity of factors involved it is not possible to determine the exact relation between the two by a study of the general mortality statistics."

[I can speak best of conditions in Chicago, and will limit my comment to conclusions based on observations made in that city. One can not say that Chicago suddenly shifted from a polluted to a non-polluted water supply. In 1900 the canal was opened but, in the meanwhile, the typhoid rate had gradually fallen from 173.8 to 27.2. But though the canal was opened in 1900 considerable sewage was still poured into the lake and some is still. As late as 1907 all the sewage from the city south of Thirty-ninth Street and north of Diversey, as well as the sewage of nearby cities immediately to the north and south, was emptying into the lake, and some of it was reaching the intakes. Even yet considerable sewage enters the lake from the nearby towns and to make the city water safe chlorination is employed. There was no sudden change from bad water to good and the improvement in the typhoid rate has not been parallel with the change in water.

The two striking sudden changes in factors causing typhoid in recent years have been the chlorination of all the water and the pasteurization of all the milk. These changes were followed by sharp reductions in the typhoid mortality rate, but no change in the general mortality rate. The typhoid mortality rate of 1.7 per 100,000, if multiplied three times, would mean 5.1 per 100,000 or .057 per 1,000. The cause of a change of .045 per 1,000 would be difficult to discover. It could easily be masked by an unusual prevalence of diarrhea due to unusually hot weather, or an unusual prevalence of pneumonia due to a cold bad spring or a great disaster such as an Iroquois fire or an Eastland occurrence.

Any one who reads the sanitary history of Chicago written by Dr. John N. Rauch will be convinced that polluted water, surface well water supply, leaky mains, offensive Healy's slough, a badly polluted Chicago River, poor sewage and polluted water taken from the lake were large factors in the general death-rate as well as in the typhoid death-rate. A people whose standards of sanitation and of decency were as low as those of the Chicago people in the sixties would be certain to have a high general mortality rate. Rauch and other good citizens in persuading them to get rid of polluted water, to establish drainage and to get purer water incidentally elevated all of their sanitary standards and in doing so lowered all of their death-rates.

I should say that the Mills-Reincke phenomenon and the Hazen theorem hold true when applied to places with high general death-rates and low sanitary standards. They do not apply when a city situated as Chicago is reaches a general death-rate of 16 or under, or another city reaches a death-rate which may be said to be normal for it, considering its climate, its racial and age group of population and its economic status. In the earlier cruder days the education and agitation necessary to procure a better water-supply elevates the general sanitary standards as the typhoid death-rate falls. Deaths from other preventable causes likewise decrease. On the other hand, when a general death-rate is as low as 14 per thousand and a typhoid death-rate as low as 1.5 per 100,000 a further diminution of the latter rate results from action against some single cause or a few causes and the general death-rate is not altered materially.—Ed.]

A National Health Department for the Period of the War. V. C. Vaughan[6] is of the opinion that the uncontrolled prevalence of various forms of contagion among our civilian population is responsible for the greatest hazard to which our soldiers in training are subjected. So long as 3 per cent. of our population are soldiers quartered among the civilian population he thinks there is need, and will be need, to have the Surgeon-General of the Army assume charge of the protection of the health of the civilian population. He therefore proposes that the U. S. Public Health Service be transferred to the Army for the period of the war.

Local Health Organization. Henry Sewell[7] holds that our present local health department organization is inadequate. Every physician should report not only every case of contagious disease promptly but every case of every other disease that is of social importance. Furthermore, every physician should act as a public educator. Every physician should regard himself as an unsalaried member of the health department. All clinical and other laboratories should likewise report to health departments. All visiting nurses, society and all similar organizations should likewise report. To care

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(6) Jour. Lab. and Clin. Med., February, 1918.
(7) Colorado Med., January, 1918.

for these reports the health administrator should be a trained man and he should be supplied with a full corps of trained, well-paid helpers. His bulletins should not only record the past but should warn of impending danger.

City Diagnosticians. Niemack[8] relates the method which has kept Charles City, Iowa, free from epidemics for eight years. The board of health provides a diagnostician and requires that every suspicious case be reported to them. Their diagnostician makes the diagnosis of contagion and assumes the responsibility. In this way they get prompt reporting of cases and satisfactory diagnoses and that is about all that is needed to control contagion in a town of good inhabitants.

Prevention of Decomposition. Fly Repellants. F. W. Foreman and G. S. Graham-Smith[9] consider that the killing of adult flies makes very little difference in the fly population. The number killed temporarily reduces the number present, but the competition among larvae is lessened and the number of flies speedily reaches the old proportions. No fly-killing campaign could possibly return results equal to those of cold weather, but in spite of cold weather flies multiply in the spring until the usual proportions are attained.

Flies may be killed by poisons absorbed from the alimentary tract but are more susceptible to respiratory poisons. The most poisonous alimentary poison found was aniline 3 per cent. in an equal volume of syrup. Other poisons of this group were 2 per cent. aniline hydrochloride, zylidine 25 per cent. in water, 1 per cent. nicotine, 1 per cent. strontium chloride, 1 per cent. barium chloride, 1 per cent. magnesium chloride, 2.5 per cent. sodium nitrite, 2 per cent. formalin, 5 per cent. aniline, 0.12 per cent. bile, 2 per cent. phenol, and bile, 0.5 per cent.

Among the poisons rapidly poisonous through the respiratory tract were aniline pyridine, crude naphtha, coal-tar oils, terpentines and volatile organic acids.

Flies are best suppressed by attacking them as eggs and larvae. The flies of the varieties which trouble man

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(8) Interstate Med. Jour., January, 1918.
(9) Jour. Hygiene, October, 1917.

most are laid in exposed animal matter, manure and refuse. To kill eggs and larvae, coal-tar oils and especially creosote are best. Crude carbolic "middle" creosote and heavy oils are good. The best form of creosote oil is that known in the trade as "coal-tar creosote oil, country make." It contains from 14 to 18 per cent. tar acids.

The best inhibitor of putrefaction, deodorant, repellant of flies and destroyer of maggots is a mixture of "country make" creosote oil containing from 14 to 18 per cent. tar acids and sufficient bases derived from light oil to make the proportion of phenolic bodies to bases 2 to 1. This mixture the authors term Solution C. Carcasses of animals properly treated with these oils do not decompose. They repell flies and any maggots that hatch in them die.

The burial of untreated carcasses does not prevent fly eggs contained in them from hatching or reaching the surface.

The cost of treatment of manure, refuse and carcasses of animals with creosote oil mixtures is not high. The creosote oil does not lessen the fertilizer value of the manure.

To lessen flies in a town, spray all manure with creosote oil at the rate of 100 c.c. per horse per day. Spray the interior of dust bins with creosote oil when empty. For this purpose a gallon of creosote oil would last the season through. Earth closets, latrines, privies, should be likewise sprayed. The bodies of dead horses and other large animals should be sprinkled over with creosote oil from a watering can. The skin should be thoroughly and completely covered with the mixture. A small quantity should be poured in all the body orifices; from 1/2 to 1 gallon suffices for a horse. Two men can make the application in fifteen minutes. A carcass treated in this way will not decompose for several weeks. Flies will not approach it for several days.

If the doors to habitations be hung with tapestry on which some of this coal-oil mixture has been sprayed flies will stay out. A single spraying will last for several days. The objections to the use of creosote oils are: (1) the irritant action on the skin; (2) the inflammability, and (3) difficulties in transport. The skin can be properly protected. Goggles should be worn by persons using the spray continuously.

Of interest because of necessities growing out of the war is the observation by Foreman and Graham-Smith that human bodies lying in No Man's Land can be made inoffensive by a spray of Solution C. The solution can be sprayed from a distance onto the body. The body thus sprayed does not become offensive to the nose and does not attract flies for several days.

Mosquito Control. R. H. Hunt[10] relates the methods employed and cost of work in mosquito control in New Jersey. In 1912 the County Mosquito Commission law became operative. Under this law a county can organize a mosquito control unit to be administered by a non-partisan commission and with an appropriation fixed by the value of the property lying within the unit. After the budget has been approved by the director of the experiment station, the giving of the funds by the county boards is mandatory. Dr. Hunt thinks that the unit should be larger than one county. For example, in the Newark bay marsh there are 29,000 acres of salt marsh lying in five counties. These five counties should be in one unit.

The salt marsh mosquitoes are *Aedes cantator* and *Aedes sollicitans*. These varieties have an average flight of from one to two miles and a maximum flight of from ten to twelve miles. After breeding in the salt marshes they seek the uplands. They seldom enter houses. They feed most actively between six and nine in the evening. These mosquitoes breed in the salty back waters of the marshes. *A. cantator* breeds in a slightly saline water, while *A. sollicitans* breeds in ordinary sea water. *A. cantator* breeds in those parts of the marsh near the uplands; *A. sollicitans* in waters near the sea. Their eggs are viable in the mud for several years. Therefore, a marsh which produces no mosquitoes one year may produce a large crop one or more years later.

The methods of prevention are, ditches, dikes and tide gates. In one unit in Jersey 1,800,000 feet of

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(10) Amer. Jour. Pub. Health, June, 1918.

ditches and eight miles of dikes and the requisite number of tide gates to control tidal waters have been built. Killie fish are very serviceable against these two varieties of mosquitoes.

Culex pipiens or *fatigens* is the house mosquito. It breeds in brooks, rain barrels, roof gutters and similar places. It will breed in slightly salt water in the upland region of marshes provided the water contains some sewage. Contrary to the general opinion, this mosquito may work its way slowly for a considerable distance across country. Hunt demonstrated a flight of six miles of this variety of mosquito.

Aedes sylvestris and *Aedea canadensis* are swamp mosquitoes. They are very difficult to control. Hunt says that when local conditions are well cared for a severe infestation of mosquitoes indicates a large area of breeding probably located at a distance.

In Essex County, the unit spent $60,000 in 1916. The cost was 9.16 cents *per capita.* The cost per square mile was $417.50. The results are: *Culex pipiens* is under control. The salt marsh varieties are a pest only at times of very heavy rainfalls and high tides of several days' duration. The problem of the woodland and swamp mosquitoes remains to be solved.

[I am told that the cantonments located in the South have suffered very little nuisance from mosquitoes and flies during the summer of 1918. The weekly health reports show very little malaria. The malaria rate is no higher than is explainable on the theory that all the malaria in camp is due to acute exacerbations in carriers. Probably few fresh infections have occurred. Comparatively little money spent in minor drainages of camp sites and a zone one mile around the camp site and some attention to the zones around the towns to which the soldiers go on furlough has accomplished this result. The principal cause for the small number of flies is prompt removal of manure and cleanliness of the camps.

See J. A. Le Prince, *Southern Medical Journal,* August, 1918; R. C. Derivaux, ibid; F. L. Hoffman, ibid; H. W. Hovenberg, ibid; T. W. Vaughan, ibid; B. Smith, ibid; H. H. Smiley, ibid.—Ed.]

Fumigation for Mosquitoes. J. B. Alexander[1] describes a method of killing mosquitoes by fumigation which was used successfully at Accra. The method consists in evaporating either creolin or izal or a combination of the two. It is not necessary to paste up the cracks. The apparatus consists of a vaporizing pan and a lamp capable of vaporizing the chemical in three hours. Unless the vaporizing is done properly soot will be deposited in the room. The method is much cheaper than fumigating by sulphur. The doors of the fumigating room are opened and after a few minutes all objectionable odors will have disappeared. Practically, it was found that this method of fumigation killed hundreds of mosquitoes—in fact completely cleared the rooms of the pests.

Preventing Waste Through Sewage. When asked by the London county council for an opinion on the values of sewage, Dr. W. H. Hamer[2] reported that in his opinion the values were not great enough to pay the cost of saving them. The place to save grease is on the dining and kitchen table. Such grease as gets into the kitchen slops should be saved by grease traps on kitchen drains. The percentage of grease in sewage is so small that it can not be collected with profit. Sewage contains 5 parts nitrogen to each 100,000. The only feasible way to collect this is by sewage farms or by sludge methods. Neither suitable land nor the labor necessary are available around London at prices necessary to make the method commercially available. Such land as it available is already too wet. If a method of fixing ammonia as an insoluble compound could be found the plan might be feasible. The night soil system as contrasted with the water carriage system permits of the use of the fertilizer value of excrementitious matter, but here there is great danger of nuisance and disease. The values of sewage are not all lost when it goes into the seas. The fish live largely on organic matter derived from sewage.

Purification of Sewage Polluted Waters. The reason for the rapid fall in the bacterial content of sewage

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(1) Medical Officer, July 6, 1918.
(2) Ibid, Oct. 27, 1917.

and ordinary water has never been fully understood. It did not seem reasonable that sunlight, radium or lack of food supply could be an adequate explanation. W. C. Purdy and C. T. Butterfield[3] find that ordinary plankton animals live on bacteria and are responsible for the purification of waters. The bacteria in a polluted water free from protozoa reach their maximum in from two to six days and are not reduced in number in from six to fifteen weeks. If, on the other hand, the polluted water contains plankton the bacteria reach their maximum numbers in one day and then rapidly decline. The number of plankton reaches its maximum in three or four days and then slowly declines. Certain protozoa that are usually abundant in sewage polluted water are able to live and multiply enormously when no food except bacteria are available.

Activated Sludge. L. Pearse[4] says that the activated sludge method offers the best promise of a solution of the problem of packing house water borne waste. Some problems such as the type of tank and especially the best depth, the amount of air to be used and method of introducing it and the drying and disposing of sludge remain to be solved. For handling packing house wastes the sewage is passed through 30-mesh screens. The sewage is then aërated in continuous flow tanks using 4 cubic feet of air to the gallon of sewage with an eight-hour contact period. This produces a stable effluent. The tanks are 16.5 feet in depth. The recoverings are grease, as scum, 360 pounds per million gallons; as grease, 47 pounds per million gallons; screenings, from 600 to 1,000 pounds per million gallons of flow; sludge, from 2,000 to 3,000 pounds of dry material per million gallons.

R. W. Pratt[5] found it possible to use lesser amounts of air through shorter contact periods when purifying the ordinary sewage of Cleveland by the activated sludge method. His paper deals principally with details of construction and maintenance of sewage-disposal works.

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(3) Amer. Jour. Pub. Health, July, 1918.
(4) Ibid, January, 1918.
(5) Ibid.

F. W. Mohlman,[6] discussing the activated sludge-aëration method of sewage treatment, says that organic matter is converted in nitrate-nitrogen in about five hours, a process which ordinarily consumed about twenty days. A six-hour treatment period suffices for most sewage. The amount of air required varies from 1.3 to 1.5 cubic feet per gallon according to the strength of the sewage. About one-third of the floor surface should be covered with porous plates. Of the sludge, 5.1 per cent. is nitrogen. The amount of sludge varies from 7,740 to 1,300 pounds per million gallons. The P_2O_5 in the sludge is about 5 per cent. Drying the sludge has proved difficult.

Streptococci in Polluted Water as an Index to Pollution. W. G. Savage and D. R. Wood[7] in a previous communication stated that streptococci in large numbers are only present in waters from unsatisfactory sources. The present set of experiments was undertaken to discover how long streptococci as compared with *B. coli* will live in sewage-contaminated water. They conclude that when streptococci and *B. coli* are found in large numbers in water it is proof that the contamination has been recent or especially abundant or both. They found that at the end of one week after water was contaminated with these organisms there had been a marked diminution in the number of both organisms. The diminution of streptococci is more rapid than that of *B. coli.* The finding of either or both organisms in 100 in 10 c.c. of water indicates that contamination has been recent. Especially is this true of streptococcus.

Sterilization of Swimming Pool Water. W. A. Manheimer[8] has found that one-half part per million of ozone in swimming pool water kills 99.8 of the bacteria except when an excess of air is introduced into the water with the ozone. He says that refiltration and disinfection of swimming pool water is now a standard procedure. All things considered, he thinks ozone purification the most satisfactory method of sterilization.

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(6) Univ. of Ill., Bull. Water Survey, Series No. 14.
(7) Jour. Hygiene, December, 1917.
(8) U. S. Pub. Health Rep., March 1, 1918.

A 60,000 gallon pool can be disinfected with a current consumption of 2 kilowatts per day with alternating current or 4 kilowatts per day with direct current plus 1 cent a day for calcium chloride. This amounts to 11 to 15 cents a day for alternating current or 21 to 29 cents a day for direct current. It costs $30 to empty and fill a pool. The frequency of emptying is reduced enough to pay for the cost of installation of an ozone machine in a short time.

H. A. Whittaker[9] demonstrated that the fill and draw method of replenishing the water in a swimming pool even when considerable chlorine was added did not keep the water in a sanitary condition. The method was expensive. Recirculation and filtration did not improve the sanitary quality of the water. Recirculation, filtration and chlorine treatment in combination was satisfactory from the sanitary and esthetic standpoint, provided the details were carried out. In a swimming pool holding 600,000 gallons, where not to exceed thirty-five persons swim at one time, and not over 100 during a ten-hour period, the water will be satisfactory if 100 gallons are circulated a minute and 1 part per million available chlorine is added to the water. A necessity is that bathers shall strictly follow standard rules. The number of bacteria must not exceed 100 per c.c. and 10 c.c. of water must not show *B. coli*.

Infection Through Bathing in Polluted Water. C. E. Smith, Jr., and H. M. Schoberg[10] say that Aiken (Proc. Ill. Water Supply Assoc., 1911) definitely settled the point that bathing in polluted water is capable of spreading diseases. Among the diseases thus spread are proteus infections, intestinal infections (Jager and Drescher), dysentery (Shiga) and typhoid fever, among intestinal diseases; eye diseases (Fehr); trachoma (Schulz) and ear infections (Cobb); gonorrhea (Skutch and Bending); prodigious infections (Hetzka and Sticker); skin infections (Aiken). The authors say that bathing plans should be licensed by the municipality and the water should be periodically examined by them. Sediment on the bottom of pools should

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(9) Jour. Amer. Med. Ass'n., June 22, 1918.
(10) Amer. Jour. Pub. Health, June, 1918.

be removed by suction apparatus devised for the purpose.

Water Purification in the Field. That the general use of anti-typhoid inoculation has not done away with the necessity for a pure water supply is the opinion of J. J. Hinman.[1] An army in the field must still reckon with Asiatic cholera, amebic and bacillary dysentery as well as with deliberate defilement and poisoning of the water supply by the enemy. All water supplies must be considered as contaminated until proven to be otherwise.

The requirements for a field purification process for water differ materially from those for a fixed plant serving a civilian community. The apparatus must be efficient for waters of different chemical constitution and different degrees and kinds of pollution. It must be transportable and durable. It must purify quickly. It must not require unavailable fuel or chemicals. General preference is now given to chlorine germicides. Some cavalry regiments use the acid sulphate method. The French use permanganates and iodine at times though sodium hypochlorite is preferred. A very extensive and valuable bibliography is attached to this article.

Halozone in Sterilization of Drinking Water. The British Research Committee[2] report favorably upon halozone. They found that one tablet (about 1½ grains) per quart will render a clear water of low organic content safe. Two tablets will render safe any water that appeals to the eye, nose and taste. Hardness of the water does not interfere with the action of halozone.

Method of Counting Bacteria in Milk. P. W. Allin[3] suggests a method of counting bacteria in milk which he thinks may be found superior to either the plate or the Breed method. The method consists in mixing a suspension of aluminum hydroxide with the milk and throwing it out with a centrifuge. The aluminum

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(1) Amer. Jour. Pub. Health, September, 1918.
(2) Brit. Med. Jour., Aug. 11, 1917.
(3) Jour. Med. Research, March, 1918.

hydroxide carries down about 95 per cent. of the bacteria and leaves the fat, casein and water behind.

Methods of Examining Disinfectants. Park and others[4] offer a preliminary report on standard methods of examining disinfectants. When this report has been finally adopted (probably, October, 1918), it is expected that it will be published as authoritative as in the case of standard methods of water analysis, milk analysis, etc.

Atmospheric Pollution. The second and third Reports of the Advisory Committee on Atmospheric Pollution[5] contain a mass of data based on many observations and analyses. When this committee has finished its work and made its final report it is probable that some solution of the vexing problems of smoke prevention and air pollution may be found.

Sewer Gas and Plumbing. A half century ago, or even less, it was held that sewer gas was so subtle that its presence was many times not detected and yet so laden with the germs of disease that diphtheria, scarlet fever, typhoid fever and other fatal maladies were the sure event to those who dwell in such air-poisoned houses. Now it is known that sewer air is ordinary air containing a little marsh gas and perhaps sulphuretted hydrogen, but that it is relatively free from disease bacteria and is not unwholesome.

C. A. Holmquist[6] says that we now equip plumbing so that it will not admit sewer gas into houses as a measure of taste and comfort and not of health. Modern plumbing is of the one-pipe system and non-siphon traps are provided. It is generally advisable to equip hotel and restaurant kitchen drains with grease traps. It is desirable that refrigerators should not drain directly into sewers. The best types of water closet is the siphon and siphon jet. The wash-down closet, though far less satisfactory as compared with these two, is an improvement on the washout, hopper, plunger valve and pan closets.

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(4) Amer. Jour. Pub. Health, July, 1918.
(5) Lancet, Oct. 27, 1917.
(6) Albany Med. Ann., May, 1918.

Tuberculosis in Dairy Cows. John Robertson[7] relates the experiences of the Birmingham (England) drainage board in ridding their herd of tuberculous cows. At the beginning of the effort, 60 per cent. of the milk cows and 12 per cent. of the heifers reacted to tuberculin. In three and a half years, the herd was freed of tuberculosis without decreasing the milk supply or suffering financial loss. All reactors were separated from the free herd. All heifer calves dropped to tuberculous cows were at once separated from their mothers. All milk was pasteurized. As the tuberculosis free heifers came to pail, the reacting cows were killed off one by one. No new cows were bought into the herd. Tuberculin testing was done twice a year. In 1916, on voluntary requests from dairymen, the authorities undertook to clean up twenty-eight herds; twenty-five were freed numbering 629 cows, and three herds numbering 107 cows were being freed. The testing was done twice a year. Some heifers, but no mature milking cows, were bought into the herd. The herds made money during the cleaning up process. The herds were kept free not only from tuberculosis but from contagious abortion and John's disease as well. The experience at Birmingham taught that very soon after a cow becomes a reactor she becomes capable of transmitting infection to other cows.

Garbage Disposal. Q. S. Osborne[8] says that there will be a shortage of meat and fats for several years after the war has ended. He advises communities not now getting the values out of their garbage to change their plans. The garbage reduction works at present operated in this country save about $8,500,000 worth of grease and $2,250,000 worth of fertilizer tankage a year. The plants produce about 9,000,000 pounds of nitrogen, 25,000,000 pounds of bone phosphate lime and 2,500,000 pounds of potash.

From the recovered glycerine, 8,000,000 pounds of nitro-glycerine could be made, and from what was left 200,000,000 twelve-ounce cakes of soap could be made.

The fertilizer has been found by the Bureau of Soils

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(7) Medical Officer, Nov. 10, 1917.
(8) Amer. Jour. Pub. Health, May, 1918.

to afford an exceptionally rapidly available nitrogen supply. At that, very much the most effective and cheapest method of recovering the values from garbage is by feeding it to hogs. With the present price of pork, a ton of garbage will produce from $7 to $8 worth of pork.

The war has caused a great decrease in the volume and in the food and grease values of garbage. In the first nine months of 1917, 30 per cent. less grease was recovered from garbage and the garbage averaged 15 per cent. less in grease percentage contained than in the same period in 1916. A part of this change was due to lessened use of meat on the table, a part to "eating the platter cleaner" and a part was due to the increase in the amount of garbage fed by individuals and by "feeders" to hogs and fowls.

Ventilation of School Rooms. All school teachers medical inspectors of schools and physicians generally will be interested in an article by S. J. Baker[9] dealing with the ventilation of schoolrooms and respiratory diseases among school children. Dr. Baker upsets many of the rather generally accepted opinions on the subject, regardless of whether old-fashioned window ventilation is conducive to comfort. She holds that it is healthier than other forms of ventilation.

The experiment covered the health conditions of 5,433 school children during about six weeks in the early spring and about ten weeks in mid-winter. The number of classrooms averaged sixty-five. The ventilation was of three types. In Type A, the rooms were ventilated by open windows and the temperature ranged between 50° and 60° F. In Type B, window ventilation, temperature ranged between 60° and 70° F., usually at 68°. Some rooms had exhaust ducts, some had not; some had window deflectors. In Type C, mechanical ventilation, plenum fan system, ventilation fans were employed; the temperature averaged 68° F.

The students were looked over by school inspectors, nurses and teachers. The economic and other conditions relating to health in the neighborhood of the several schools were made to parallel as much as possible.

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(9) Amer. Jour. Pub. Health, January, 1918.

In Type C rooms, the absences by reason of respiratory diseases were 32 per cent. higher than in the Type B rooms and 40 per cent. higher than in the Type A rooms. When it comes to attacks of colds and other respiratory diseases severe enough to keep children at home, mechanically ventilated schoolrooms are worst. In Type C rooms, the respiratory disease rate among the students found at their desks was 98 per cent. higher than in the Type B rooms and 70 per cent. higher than in the Type A rooms.

The order of precedence from the health standpoint of the three, when it comes to colds and other minor infections, was: Type C, 49; Type A, 22; Type B, 16. Dr. Baker could not see that humidity affected the sickness rate. The sickness rate among girls was as high as that among boys.

FOOD.

Food in War Time. D. N. Paton[1] says that an effort to fix the price of milk should be accompanied by a similar effort to fix the price of meat, else the farmer will kill his milch cows for beef. Similarly, the price of various cereals must be fixed in relation to the price of meat and milk. At that he does not think highly of the plan of price-fixing either as to efficacy in establishing prices or as to securing a proper distribution of the food supply. An alternative plan for securing distribution of the available food is to allow prices to regulate themselves but to increase wages proportionately. The objection to this plan is that unorganized labor and their families suffer. Another alternative is to allow prices to regulate themselves and then to give relief to those who need it. One detail of such a plan is to fix the price to be paid for flour by the less well-to-do on the basis of family income, the government to pay the difference between that price and the prevailing price. For example, when the market price of flour is 12 cents a pound, a family with a weekly income of $5.00 to $12.00 would pay 6 cents and the state would pay the balance.

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(1) Jour. State Med., March and April, 1918.

Still another alternative is to limit the price by limiting consumption. Efforts to limit consumption that reduce waste are commendable—beyond that point they are not. Paton says that the British nation could live for two months on savings made in three directions combined. Diversion from brewing and distilling would save 3.5 million-million calories. The drinking of spirits and beer is sheer waste and should not be allowed in Great Britain in war times, for beer is not in any economic sense a food. Better milling, turning 80 per cent. of the grain into flour instead of 70, would gain 1 million-million calories. To import meat and not to grow it would save 3.5 million-million calories. The formation of meat from vegetables, including grain, is a most wasteful process. The pig is the least wasteful transformer, but it takes 6 pounds of grain fed to hogs to make 1 pound of meat. The space used in ships for the importation of grain to feed hogs and cows should be used to import meat. Six tons of grain represents one ton of bacon.

The food requirement of a man being 1, those of a woman are calculated at 0.8; of a boy of from 14 to 16, 0.8; girl of from 14 to 16, 0.7; child of from 2 to 5, 0.4; child under 2, 0.3. The population of Great Britain figured on this basis is as follows:

Men over 16	14,574,430	men	value	14,574,430
Women over 16	15,948,114	”	”	12,758,491
Males 14 to 16	862,203	”	”	689,762
Females 14 to 16	859,815	”	”	601,870
Children 10 to 13	3,548,403	”	”	2,129,042
Children 6 to 9	3,708,513	”	”	1,854,256
Children 0 to 5	5,772,153	”	”	2,308,861
Total	45,273,631			34,916,712

The number of calories required to feed the nation is 43 3/4 million-million. More than 34 per cent. of all the energy of the nation is derived from cereals. This is divided as follows: Wheat flour, 30 per cent.; oatmeal, 1.6 per cent.; barley flour, 0.4 per cent.; sago, tapioca, etc., 0.7 per cent.; corn flour, 0.3 per cent.; rice, 0.1 per cent. The reason for the pre-eminence of cereals is that they contain proteids and carbohydrates and keep well. The presence of gluten is responsible for the pre-eminence of wheat. Milk is necessary for children. Adults, however, do not need it, and its use by adults should be discouraged. Since cheese furnishes an outlet for the most valuable constituent of milk protein and since cheese keeps well, its wide use is to be encouraged. On account of their stability and high food value the use of milk powders is to be encouraged. Milk fat is not the most economic fat and its extensive use should not be encouraged. Even children do well on margarines, both vegetable and meat, provided they get milk and green vegetables.

Milk in War Time. C. Porcher[2] says that even though the war be prolonged Paris will always have enough milk for the invalids and children provided the inhabitants obey the law and restrain themselves. Paris before the war consumed an average of one million liters of milk a day. Consumption in May and June reach 1,100,000. It descended to 850,000 to 900,000 liters in winter. This was the consumption of pasteurized liquid milk. Before the war very little sterilized milk and still less concentrated milk was used. With the advent of the war there came the use of concentrated milk. Many who now consume concentrated milks will continue to do so after the war. Especially is the future for milk powder bright.

The war has decreased the supply of milk by decreasing the number of cows, by increasing the difficulties of transportation but above all by increasing the use of cheese. The diminution in the quantity of fresh milk is not so much due to the killing of dairy cows as it is to the fever for cheese which has gripped the people. Last December and January the daily use of milk in Paris fell to 400,000 liters. Since the beginning of the war the question of milk for children has been uppermost in the minds of those in charge of the planning for an adequate food supply. Fearing a siege of Paris, a herd of milk cows were brought into Paris and placed in the parks. In the necessary hurry milk cows were gathered together wherever found. In consequence, many sick cows, tuberculous cows, cows with mammitis and cows that were

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(2) Paris méd., April 6, 1918.

poor milkers, were brought in. For such an experiment to succeed, the cows should be carefully selected and tuberculosis cows, cows with mammitis and border cows should be eliminated. At one time Paris got 12,000 liters of milk a day from these cows. Even now 6,000 liters a day are obtained.

For table use sweetened condensed milk is good. For medical uses non-sweetened evaporated milks are excellent. The chemical formula of sweetened condensed milk condemns them for prolonged use by babies but fits them admirably for table and cooking milk. On the other hand, evaporated milk is excellent for babies and sick people. There are certain digestive disturbances in children for which non-diluted evaporated milk will act almost as a specific. Pouchet thinks evaporated milk for infant feeding has come to stay.

Many physicians in Paris are now using milk powder in their own families and prescribing it for their patients. Unfortunately, many milk powders now on the market are poor products and the prices asked are exorbitant. If good milk powders at a cheap price were available their use would be very wide. Milk powder fits well into the present needs in that it spares sugar, does not require the use of cans, is not bulky and keeps well.

In spite of the use of condensed milks and milk powders it may be necessary next winter to issue milk cards. The milk card gives the bearer the right to first chance at the available milk up to 9 o'clock in the morning. All families with small children get such cards, the amount called for being determined by the number and age of the children. Cards for adults who need milk by reason of illness are issued on physician's prescriptions. Unfortunately, this last provision is open to wide abuse. It was found that one physician issued 250 certificates. Another issued a certificate in a certain family for the father, mother and each child. In a certain section of Paris which normally consumes 60,000 liters of milk last December, when only 30,000 liters were available, physicians' certificates calling for 12,500 liters were out.

[A marked effect of the war has been the increased use of milk products by all the warring nations. The use of cheese has increased greatly. The exports of cheese from the United States shows a great jump.

There has also been a greatly increased demand for condensed and evaporated milk. The exports of these products is many times what it was prior to 1914. The unexpected change was in the use of milk powder. This product is now being advocated not only as a substitute for fresh milk but as superior in the feeding of babies suffering from acute indigestion and from marasmus. See Report of British Local Government Board No. 24, on Dried Milk, 1918.—ED.]

War Bread. R. Hutchison[3] says that in the milling of wheat flour 30 per cent. of the berry is discarded. In the discard are found the bran and germ. What goes into flour is nothing more than the endosperm. War flour contains 81 per cent. of the berry. It contains in addition to the starch and gluten of the endosperm considerable bran and some germ. It is richer in protein, fat, mineral matter and vitamines than patent flour. As to digestibility war flour is practically as easily and fully digested as ordinary flour.

Corn flour is not more heating than wheat flour. It has no greater tendency to cause acne or other skin eruptions. The greater frequency of "rope" caused by the *Bacillus mesentericus* in war bread is due to the custom the bakers have of keeping it in boxes. In conclusion he says that war bread is both nutritious and wholesome. Professor Thompson in discussing Dr. Hutchison's paper said that corn flour is as nearly a complete proteid food as is wheat flour. While zein does not contain all the amino-acids needed for growth, glutelin also present in corn flour supplies the amino-acids missing in zein. The amino-acids of oats, barley and rye were also satisfactory for nutrition and growth.

E. Weill and G. Mouriquand[4] tell us that before the war the French used bread that was made of from 65 to 70 per cent. of the wheat berry. For many cakes they used 60 per cent. wheat berry flour. It has been stated that bread from 65 per cent. wheat berry flour contains too little cellulose, fat, albumin and minerals and that

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(3) Practitioner, December, 1917.
(4) Paris méd., April 6, 1918.

its wide use was bringing on national disaster. The authors do not agree with this opinion for they say the Frenchman uses enough, meat, vegetables and fruit to offset the deficiencies of his bread. The war has changed the bread and now the Frenchman is using bread made from 85 per cent. flour and is adding to it flours from other grains. When 70 per cent flour is cooked into bread and eaten 90 per cent of its value is digested and assimilated. Bread from 85 per cent. flour is not availed of to the same degree. But in spite of that fact, 100 pounds of wheat made into 85 per cent. flour will furnish more nourishment than the same quantity of wheat made into 65 per cent. flour.

The authors conducted a series of experiments to determine the nutritive qualities of breads from different sources. They found it advisable to make use of birds accustomed to eating grains. Guinea-pigs were incapable of thriving on any grains. They found that whole wheat had anti-beriberi qualities. Pigeons fed continuously on decorticated grain developed beriberi. They found that commercial flours made from decorticated wheat berry contained enough of the outer layers to prevent beriberi, therefore they could not be used for the experiments. In the experiments the grains were examined microscopically to make certain that they were free from outer layers.

As to mixtures of other grains with wheat a mixture of 10 per cent. rice flour and 90 per cent. wheat flour contains 9.79 per cent. albumins, 0.94 per cent. fats, 95.09 starch, 0.48 per cent. salts, and gives 35.83 calories. Such a bread has a food value equal to that of bread from wheat flour.

The authors confirm the observation frequently made that polished rice produces beriberi and that the disease is quickly cured in a few hours by feeding whole wheat grains. Pigeons fed exclusively on a bread made from wheat flour (74 per cent.) 80 to 90 per cent. and 10 to 20 per cent. of polished rice developed beriberi. Where an exclusive bread diet is used some rich polishings should be added to the bread.

Barley bread from the standpoint of nutrition is about equal to wheat bread. The introduction of barley flour into war bread is not objectionable but it should have some of the cuticle of the grain left in it.

All the facts observed proved the high nutritive value of flour from whole corn, but they also show the dangers from the use of decorticated grain. The fats and the minerals of the corn grain are necessary.

The conclusion is that changing the milling of wheat, corn, rice, barley and rye to an 85 per cent. basis of milling has added to the nutritive value of the flours. Since cooking destroys some but not all the vitamines flours for bread should contain a little more of the outside layers of the berry than the proportion found necessary when the berries are fed to pigeons. But observations on pigeons do not necessarily apply to human beings and, above all, the human animal eats a mixed and varied diet.

War bread has been of great advantage to those suffering from constipation. It has not suited those with dilatation of the stomach or those with ulceration of the stomach. Ordinary people have digested it well. Snyder found that a bread from flour milled to 72.6 per cent. was 90.1 per cent. digested and absorbed. A brown bread of unknown percentage in milling was 85.5 digested and absorbed and a bread made from whole wheat flour was 80.7 per cent. digested and absorbed. The authors calculate from this that when bread is made from wheat flour 72.1 per cent. milled the body uses 65.41 per cent of the berry. When from whole wheat flour it uses 80.7 per cent. of the berry. There is economy, therefore, in the use of flours containing bran. But brown breads develop some acid and a little bitterness. This can be avoided by mixing the dough with a little lime water. The bread will be darker, but it will be sweeter, not acid and will keep longer. The lime does not injure the vitamines.

In Italy they tried bread made from whole wheat and found that it disagreed with many people. They then commenced making Bergame bread. They soak wheat berries in water at 68° F. for 48 hours. This softens the berry and starts the sprouting process. They then grind it in mills and make bread of the flour. The process is a first step in malting. It adds to the flavor, the digestibility and the nutritional quality of the bread.

An excellent method consists in soaking bran [wheat, rice, corn or other] in water either hot or cold. The bran water is then used to mix in the dough. Bread made in this way is rich in minerals and in vitamines and has a rare nutty flavor. It is especially good for dyspeptics who need the salts and vitamines of bran but can not digest its cellulose.

To the discussion of the relative advantages of breads made from patent flour and war flour C. Voegtlin and C. W. Myers[5] offer a contribution based upon a large amount of experimental work. A point of great interest in their work is that they regard highly milled corn meal as on about the same plane as highly milled wheat flour. They hold that the highly milled products are without exception inferior in dietetic value as regards growth to foods prepared from the whole grain.

The experiences of some persons with delicate digestions indicate that war bread is not best for them even though it is more nutritious and contains more vitamines. For them perhaps a compromise flour is best. One from which nothing has been removed except the bran itself, the germ and the layers next the bran and even a little of the bran itself having been left in.

In the very extensive experiments of Voegtlin and Myers with young fowls it was found that white bread, even when made with evaporated milk and yeast, would not maintain growth. White flour is deficient in antiberiberi and fat-soluble vitamines. It does not contain enough proteid or enough inorganic salts. A wheat flour containing a considerable part of the germ and the superficial layers of the grain supports growth of mice and pigeons well when supplemented with inorganic salts. So does whole wheat flour. When hogs are fed highly milled corn grits they fail to grow. Fed whole corn and mineral salts they grow well.

"In the light of our present knowledge, it would appear that bread made from whole wheat flour or old fashioned corn meal should be used in preference to white bread and highly milled corn foods whenever the diet is restricted to these cereal foods to the more or less

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(5) U. S. Pub. Health Rep., May 31, 1918.

complete exclusion of other foods possessing greater dietary values.''

Tests for Vitamines. The biologic test of the presence of vitamines in foods offers so many practical difficulties that scientists have endeavored to discover a substitute test that would be dependable and, at the same time, easier of application. C. Voegtlin and C. A. Meyers[6] find that the phosphoric anhydride determination of wheat and corn yields fairly satisfactory information as to the content of these products in accessory foods. A low phosphoric anhydride content indicates that the product is poor in vitamines. The accompany-tables are condensed from more extensive tables occurring in their reports:

TABLE 1.—CORN PRODUCTS—CONTENT IN P_2O_5 AND VITAMINES.

Sample No.	Nature of product.	Source.	Degree of milling.	P_2O_5 in per cent.	Estimated vitamine content (from feeding experiments).	
					Fat-soluble vitamine.	Antineuritic vitamine.
2	Corn, whole..	California	Not milled...	.84	Relatively high	High.
6	....do	Georgia	....do	.61	....do	Do.
25	Corn meal....	Georgia (buhr mill).	Undermilled; considerable bran and germ.	.77	....do	Do. Do. Do.
83	....do	Tennessee (buhr mill).	....do	.67	....do	Do.
			....do		....do	Fairly high.
33	Corn grits....	South Carolina (buhr mill).	Undermilled; contains some germ.	.67	....do	Prevents polyneuritis when added to highly milled corn grits in proportion of 10 gms. to 35 gms.
30	Hominy	....do		.64	Doubtful (not estimated).	
38	Corn bran...	....do	....do	.78		
7	Corn germ...	Indiana (roller mill).	Germ plus traces of bran.	2.81	High	High.
18	Corn meal...	Maryland (roller mill).	Highly milled.	.29	Low	Very low. Produced polyneuritis in 3 weeks.
17	Corn grits...	North Carolina (roller mill).	....do	.13	....do	Do.
9	....do	Mississippi State Hospital.	....do	.18	....do	Do.

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(6) U. S. Pub. Health Reports, June 7, 1918.

TABLE 2.—P_2O_5 CONTENT OF VARIOUS PRODUCTS FROM SAME RUN OF CORN (MARYLAND ROLLER MILL).

Sample No.	Nature of product.	Source.	Degree of milling.	P_2O_5 in per cent.	Estimated vitamine content (from feeding experiments).	
					Fat-soluble vitamine.	Antineuritic vitamine.
49	Wheat (whole)	....	....	1.12	Considerable .	High.
61	....	....	....	1.01	....do.......	Do.
86	....	South Carolina.	....	.89	....do.......	Do.
85	"Graham" flour from wheat No. 86	South Carolina (buhr mill).	Undermilled..	.86	....do.......	Do.
84	Wheat bran..	....do.......	Undermilled; white material adhering to cellulose.	2.12	Probably deficient (not estimated).	Do.
97	"Whole-wheat" flour.	Missouri (roller mill).	Undermilled.. contains some germ and bran.	.62	Considerable .	Do.
98	"Red dog" feed	Washington, D. C. (roller mill).	Undermilled;	.92	....do.......	Do.
103	"White" middlings...	....do.........	....do.......	1.65	....do.......	Do.
101	"Brown" middlings...	....do.........	....do.......	1.88	....do.......	Do.
88	Wheat flour from No. 86	South Carolina (buhr mill).	Highly milled.	.26	Very deficient.	Deficient.
91	"Patent" flour	Virginia	....do.......	.20	....do.......	Very deficient.
94	....do.......	Michigan	....do.......	.21	....do.......	Do.

TABLE 3.—WHEAT PRODUCTS—CONTENT IN P_2O_5 AND VITAMINES.

Sample No.	Nature of product.	Appearance.	P_2O_5 per c
37	Corn	Whole	0.80
39	"Table meal"......................	Considerable bran and germ.......	.81
40	"Table hominy".....................	No bran or germ..................	.17
41	"Cream meal"......................	....do	.16
43	Corn flour........................	White: no bran or germ...........	.21
42	Corn germ.........................	Largely germ: little bran.........	2.57
44	Corn bran.........................	Largely bran......................	.69

Poisoning Due to Milk. Marfan[7] says that intoxications due to milk are rare, but every physician should know of them. There are cases on record in which nursing babies have diarrhea and vomiting from nursing mothers who had eaten oysters, shellfish and cabbage. Analysis of the milk in these cases has shown

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(7) Ann. d'hyg. pub. et de méd. legal, March, 1918.

nothing. Although alcohol is eliminated in breast milk to only a small extent it is certain that the milk of an alcoholic mother can cause nervous perturbation, convulsions and dyspepsia in the baby. It is not certain that purgatives are eliminated in the milk. The usual effect of taking a purge is to decrease the quantity of milk. Arsenic, mercury and colchicum are in part eliminated in the milk. Marfan saw one case in which the mother had been poisoned by corrosive sublimate and the baby at the breast developed diarrhea.

When a nursing mother menstruates, when she suffers from vaccine, when she has sore throat, her baby will nurse less readily and will have a little bowel trouble and will lose a little weight, but the condition is mild and transient. It is probably due to substances eliminated in the milk. The toxins of tetanus and diphtheria pass into the milk. Cow's milk likewise occasionally poisons. In milk powder chlorate of potash has been found. In market milk, boric acid, salicylic acid and formaldehyde and chlorates are found at times. The possibility of such cause must be borne in mind. Sometimes the milk of cows is harmful because the cows have eaten harmful plants such as colchicum or meadow saffron. Fresh beet leaves gathered in October fed to cows cause the milk to be irritating and to produce severe diarrhea. The same is true of milk from cows fed on brewers' grains, distillers' slops, molasses from sugar refineries, oil cake for oil establishments and beet pulp. And, finally, an infant may develop anaphylaxis for milk.

[It may be that brewers' grains, sugar house refuse and beet pulp as made in this country are fit food for milk cows. At least the matter should have careful investigation.—ED.]

Pasteurization of Milk. J. A. Boudouin[8] says that the principal cause of infant mortality next to prenatal influences is the gradual decrease in breast-feeding and the constant increase in a corresponding ratio of artificial feeding mostly with cow's milk. To lessen the danger of cow's milk he advocates universal pasteurization. An inquiry showed that in 8 per cent. of American cities

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(8) Pub. Health Jour., January, 1918.

4.7 per cent. of the milk was pasteurized in 1905. In 1916, thirty-four cities reported that 70.31 per cent. of their milk was pasteurized. Chicago, Detroit and New York reported that in 1916 100 per cent. of their milk was pasteurized. On the other hand, Fall River reported that only 6.4 per cent. of its milk was so treated. He says that where pasteurization has been the only, or at any rate the chief procedure, used for lowering the infant mortality rate the decline has been 31.22 per cent. He names pasteurization of milk and the education of mothers as the two most effective procedures in lowering the infant mortality rate.

[The pasteurization of milk is so well-established that it is ceasing to be a controversial matter. The literature on the subject is becoming less year by year, as year by year the number of states and cities requiring it increases. In 1908, when the Chicago ordinance was passed, it was promised that pasteurization would lower the general infant death-rate, the diarrheal disease rate and the death-rates due to typhoid fever, septic sore throat, tuberculosis, scarlet fever and diphtheria. It has accomplished all that was promised except as to diphtheria. Pasteurization is now accepted as a necessary measure for protection of a community against certain forms of milk-borne contagion. There are indications that having accepted pasteurized milk we are nearly ready for the next step. This may be milk powder, canned milk, Buddeized milk, electrically sterilized milk, frozen milk, or several of these in combination. But we seem to be about ready for a milk free from disease-producing bacteria and capable of being shipped long distances and fit to use when a week or more old.—Ed.]

Eggs as Food. M. G. Linossier[9] says that eggs only produce intoxication in those predisposed. The predisposition is often congenital. When it is acquired it appears often to be due to liver and intestinal trouble. It is either due to fault in assimilation or to anaphylaxis. The toxic substance is probably a toxalbumin and not a chemical principle normally present in eggs.

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(9) Bull. de l'acad. de méd., March 19, 1918.

At the same time it is not a decomposition process due to decay. The toxalbumin is destroyed by heat.

Persons harmed by eggs will not be injured if they eat eggs that have been cooked enough to coagulate all the albumin, that of the yellow as well as that of the white. Contrary to the general belief, cooked eggs are more easily digested than raw ones. Cooked eggs are digested in the stomach. Raw eggs are passed on to the intestines and there digested. If eggs are properly cooked it is not necessary to restrain persons with liver trouble from using them except that persons with gallstones should not eat them since they tend to cause hypercholesterinemia. One egg a day is enough. Eggs well cooked can be eaten by albuminurics. Persons with chronic interstitial nephritis and hypercholesterinemia should not eat them.

Rural Meat Inspection. W. G. Savage[1] recognizes the wellnigh insuperable difficulties in meat inspection in rural districts. The provision of public abattoirs, he thinks, is impractical. Nor does he think it advisable to have compulsory and stringent by-laws for slaughter houses. The only feasible plan is to require that slaughtering be done under permits at fixed hours when an inspector could attend. The inspectors should have some training in meat inspection. In the discussion the very great need of meat inspection in the rural districts and small towns was made manifest, but no one could suggest an improvement on Dr. Savage's recommendations.

War Time Food Problems. C. L. Alsberg[2] gives the following table showing the number of pounds of starch fed as stock feed and principally grains to produce 1,000 calories: Milk, 2.9; pork, 3.0; veal, 4.7; mutton, 5.3; eggs, 7.0; baby beef, 7.0; steer beef, 9.0; corn-fed poultry, 15.0; poultry fed on corn, distillery grains and buttermilk, 3.3.

It is evident that feeding grain to animals to produce meat is uneconomical. Less than 7 per cent. of the grain crop is eaten by man, the remainder being used principally to feed animals. He suggests the fol-

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(1) Jour. Royal Sanitary Inst., October, 1917.
(2) New York Med. Jour., Nov. 24, 1917.

lowing reforms: Killing of all food animals when young; placing a head tax on bull calves 6 months old; taxing all hogs weighing more than 150 pounds; protection of female calves.

The dairy cow is the best converter of proteins. Alsberg suggests that we should stimulate the use of skim milk by human beings. It can be consumed as cheese, cottage cheese, buttermilk or cooking milk. If we are put to it for fats, we can live in this country on the fats produced from cottonseed, peanuts and soy beans.

Cold Pack Canning and Food Poisoning. E. C. Dickson[3] says that during the last twenty years there have been eleven recorded outbreaks of botulism. During the last six years he has located eleven hitherto unreported outbreaks all of which occurred on the Pacific Coast. In eighteen outbreaks one was due to spoiled beef, one to minced chicken, one to canned pork and beans, one to tamales, one to sausage, two to clam broth, while eleven were due to canned vegetables, pears, apricots, corn, asparagus, beans and spinach. The botulism bacillus can produce its toxin when grown in a vegetable medium.

The directions for cold packing given by the Federal Government do not call for enough heat to kill either *B. botulinus* or *B. subtilis*. Dickson packed vegetables in cans, infected them with *B. botulinus*, left the cans in boiling water from 120 to 180 minutes, sealed them and had *B. botulinus* develop in each case. The conditions in a can of vegetables improperly sterilized are ideal for this bacillus. However, the cooking temperature destroys the toxin of botulinus and such vegetables are safe to eat after they have been cooked.

Use of Saccharin in Food. G. Pouchet[4] says there is great temptation to permit the use of saccharin in place of sugar now that the war has made sugar scarce. It is to be remembered that saccharin is a flavor only while sugar is both flavor and food. Saccharin may even be definitely harmful. It is an antiseptic. Antiseptics make foods chemically stable. A food to be fit for nourishment must be chemically unstable. Sac-

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(3) Jour. Amer. Med. Ass'n., Sept. 22, 1917.
(4) Paris méd., April 6, 1918.

charin should be absolutely prohibited, he says, (1) in all foods for children under 5 years of age, and in foods for the old and for the sick; (2) in all pharmaceutical preparations when it displaces sugar; (3) in all foods where the food value of sugar is essential or where the demand is for a very sweet product, since in this last group harmful quantities of saccharin will be required. The great field for saccharin is in those foods in which glucose can replace sugar, but in which the taste of glucose needs to be slightly supplemented by a sweet.

Diet and Rickets. A. F. Ness and L. J. Unger[5] while investigating the wide-spread prevalence of rickets among negroes in the North found the probable explanation to lie in their diet. They eat meat and bread almost exclusively. When they eat vegetables and fruits they eat the canned articles. When they cook vegetables they throw the cooking water away. Before they came north they lived largely on fresh garden stuff. The negro in the tropics rarely has rickets. Nearly all negro children in the North have rickets. The probable explanation is that they do not get enough calcium and are always near or below the line of minimum requirements. The remedy is a diet richer in vegetables, fruit and milk.

Drying Foods. A duplication of the meat inspection service of the Bureau of Animal Industry to stimulate and standardize the industry of dehydrating foods is proposed by L. P. Brown.[6] Dehydrating foods saves supplies, prevents waste, makes fresh food available out of season, lessens charges for shipping, saves sugar and cans. Brown suggests that dried fruits and vegetables be added to the Army and Navy ration but the dried foods will not be available on the market unless the government stimulates the industry.

Vitamines in Dried Vegetables. That eating fresh vegetables prevents scurvy is accepted. To determine whether drying destroyed the antiscorbutic principle M. H. Givens and B. Cohen[7] made some feeding tests with guinea-pigs. They found that 1 gram daily of

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(5) Jour. Amer. Med. Ass'n., March 30, 1918.
(6) Amer. Jour. Pub. Health, May, 1918.
(7) Jour. Biol. Chem., October, 1918.

fresh cabbage was sufficient to prevent a guinea-pig from becoming scurvied.

The antiscorbutic principle is not the same as the fat-soluble growth substance and the water-soluble accessory growth substance. The antiscorbutic action is not the result of the roughage containing in cabbage and other vegetables.

Drying cabbage at from 105° to 125°F. did not destroy the antiscorbutic substance. Cabbage dried at this temperature prolonged the life of guinea-pigs and initiated the recovery of guinea pigs suffering from mild scurvy. Cabbage dried at 167°F. for a short while and then at 150° for several days was found to have lost this principle. Cabbage cooked for 30 minutes and then dried for two days at 150° to 160°F. was found to have lost the antiscorbutic principle. The same findings held true for dried and cooked potatoes.

Antiberiberi Substance. K. Suguira[8] succeeded in extracting from carrots a yellow crystalline substance capable of curing polyneuritis in pigeons. The carrots are extracted from water and the watery extract is concentrated to a syrup. A crystalline substance with the same therapeutic power has been extracted from yeast. Substances curative for polyneuritis in fowls have now been obtained from yeast, carrots, cabbage, potatoes, animal tissues and egg yolk.

Potatoes as Food. It has been said that the proteid of potato is especially nutritious. With this opinion E. V. McCollum, N. Simonds and H. T. Parsons[9] do not agree. Their experiments prove that the dietary properties of potatoes are very similar to those of cereals. There is the same shortage in calcium, sodium and chlorine as with cereals made from grains. Potato is high in potassium—about three times as high as oatmeal and wheat flour. It is short on protein but not more so than grain flours. The protein molecule is as nutritious as the wheat protein molecule but no more so.

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(8) Jour. Biol. Chem., October, 1918.
(9) Ibid.

Potato has as much fat-soluble growth principle as grain flour but no more. Rats matured well on a diet composed of potato 80 to 90 per cent. purified protein, sodium chloride, sodium carbonate and some fat containing the growth substance.

Bananas as Food. K. Sugiura and S. R. Benedict[1] found bananas deficient in proteid and water-soluble accessory growth substance. When to them in the diet of rats purified casein and carrot extract was added the rats grew normally and reproduced. However, they did not produce an adequate supply of milk of proper quality. Experiments showed that the trouble lay with the quality and not the quantity of milk. This observation seemed to prove that certain foods affect the quality of milk, others the quantity—a much debated point in recent years. In supplementing bananas purified casein must be used for the best effects. Washed or dialyzed beef was not a satisfactory substitute.

Physical Examination of Waiters. C. E. McCombs[2] advocates periodic physical examination of waiters, cooks and others handling food. He quotes "Health of Food Handlers" (Monograph Series, Department of Health, New York) as saying that one waiter out of sixty-three examined in New York City had open syphilis. The disease was found to be three and one-half times as prevalent among waiters as among other food handlers.

Sanitary Control of Ice Cream. H. W. Hamilton[3] thinks that the time has come for health departments to begin the control of the production of ice cream. He contends that infected and decomposing ice cream is doing a lot of harm. He collates a considerable number of epidemics in which the proof is fair that the disease was spread by ice cream, likewise a considerable number of outbreaks of food poisoning due to spoiled ice cream. Rules and regulations for ice cream factories are given.

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(1) Jour. Biol. Chem., October, 1918.
(2) Amer. Jour. Pub. Health, September, 1918.
(3) Ibid.

PERSONAL HYGIENE.

Drunkenness. The suppression of the liquor traffic has the unqualified support of health officials as well as of practitioners of medicine. The indications are that the United States will become dry in 1919 and that the constitution will be amended so as to make it permanently so before the war has ended. In all of the countries of western Europe the use of intoxicating beverages has been greatly lessened. The temperance movement in the United States has had the support of health authorities. The same can be said of the movement abroad. The opinion of the British authorities is represented by Lord D'Abernon,[7] who holds that liquor drinking does an enormous amount of damage to the public health. He is of the opinion that drinking can be diminished to a considerable degree by legislative and administrative action. A comparison of statistics shows that the rates for convictions for drunkenness, delirium tremens and deaths from excessive drinking decline in a parallel fashion as the use of liquor is restrained. In 1916, these three rates declined to about 40 per cent. of the level of 1913 and the decline of the three was uniform (Fig. 4, p. 277).

Healthful Dressing. James[8] thinks that women dress more sensibly than men. Nutrition and a good part of resistance are dependent upon the blood-stream. The amount of blood in a given area is determined by the vasomotor apparatus. That this apparatus may function properly it is advisable that the skin should be subjected to marked changes in temperature.

Huntington has proved that men function best in climates where the weather is changeable, where there are extremes of heat and cold and several storm periods each year. In therapeutics we make use of the same principle when we employ Scotch douches, heliotherapy, Kneipp cures, wet packs and Turkish baths.

The clothes that make most for vigor and health are not those which keep the temperature of the body most uniform but those which permit of chilling. "The best modern costumes for men ever designed by a civi-

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(7) Jour. State Medicine, November, 1917.
(8) Med. Record, April 13, 1918.

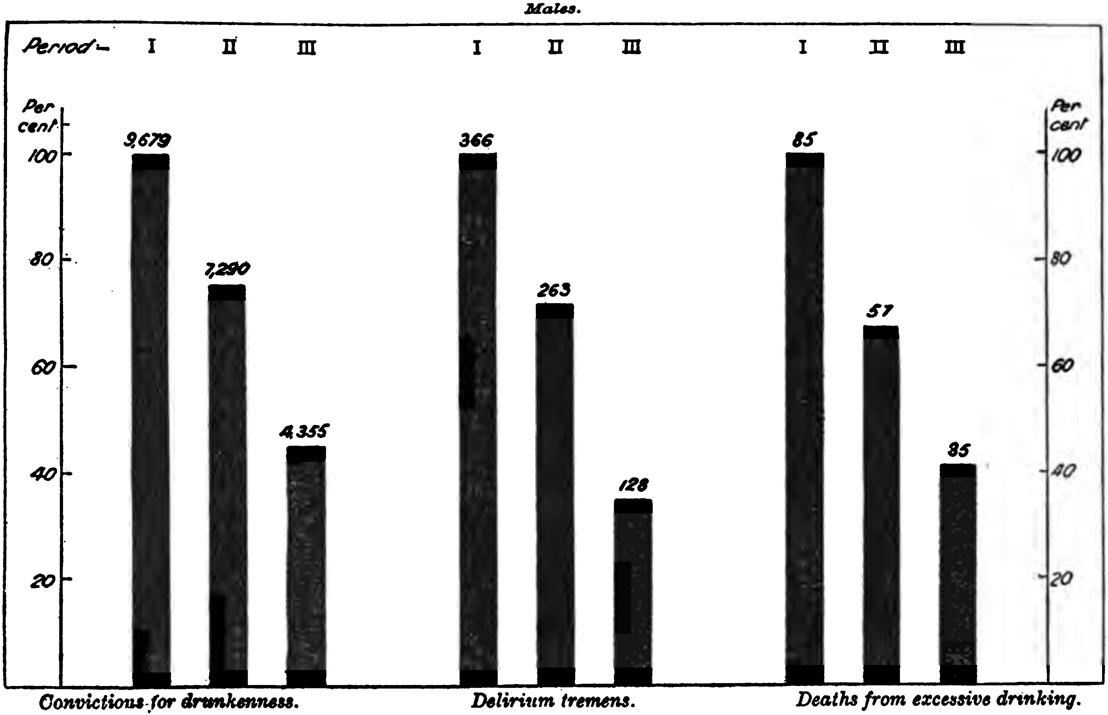

Fig. 4—Convictions for drunkenness treated in Poor Law Infirmaries, and deaths from excessive drinking in Liverpool in three twelve-month periods. I. August 15, 1914; August 16, 1914, to August 15, 1915; III. August 16, 1915, to August 15, 1916.

lized people is the Highlander's kilt with its bare knees and thin trews. Women have fewer colds than men—women are superior to the weather; men are slaves to it. The reason is that women train their vasomotor apparatus by wearing low necks and short sleeves, open work stockings and all such. Men throw theirs out of commission and invite respiratory disorders by wearing clothes which in comparison are "swaddling clothes."

James suggests that as the skirts of women climb higher the wearers should become healthier and finally as they approach the kilt of the Highlander their vigor and resistance should approach that of the sturdy sons of Scotia.

James thinks also that one reason for the lower infant mortality rates of the present day is the fact that babies no longer wear belly bands, binders and swaddling clothes and that the practice of sewing the baby up has gone out of style.

The acme of folly of men's apparel is reached in the United States army uniform. The soldier's leg from the knee down is tightly encased in leather or a tightly wound woolen binder. He wears a tight coat heavily padded and buttoned all the way up to the neck. His head is always covered by a cap. Washington's men at Valley Forge may have been better clad from the standpoint of health and vigor. The Indian does not catch cold in his nakedness because as he says "Indian all face." The Romans put their fighting men in short tunics with bare legs even when they fought in Germany in winter. The sailors in his judgment are better clad. They wear a blouse which exposes their chests and their flaring trousers' legs permit the cold air to enter.

Hubbard[9] does not agree with James as to women's dress. He says: "The prevailing fair sex fashions of the day seem to be designed for the express purpose of eliminating any suggestion of body protection. After Eve had eaten of the apple she became a prude and woman has since worn real clothes. But just now they seem inclined again to dress primitively. For the benefit of mankind some one should pass the apples out again."

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(9) Cleveland Med. Jour., March, 1918.

Heat Stroke and Beer Drinking. N. A. Gauss and K. A. Meyer,[1] as the result of a study of 158 patients suffering from heat stroke came to the conclusion that beer drinking was an important etiologic factor. Practically all of them showed that they had been drinking when they entered Cook County Hospital. In one group of twenty-five, all but two admitted that they had taken beer in amounts ranging from one pint to one gallon, and all but one admitted that he habitually drank it. Of the 158 patients 152 were males; 116 were in the third, fourth and fifth decades of life. This unusual number of heat strokes occurred in outdoor workers during an unusually severe hot spell in July, 1916. The patients who developed very high temperatures generally had no prodromes. Those who suffered from dizziness and headaches in advance of the stroke generally ran lower temperatures. The death-rate was almost proportionate to the temperature of the patient.

Color Blindness. G. L. Collins[2] makes a distinction between those who are only slightly color blind and those who are dangerously so. The Eldridge-Green lantern will satisfactorily divide the color blind into those who are dangerous and those that are harmless. The Jennings self-recorded worsted test is accurate enough when great accuracy is not essential but it will not do for tests of sailors or train men. Among healthy persons in the United States, dangerous color blindness occurs in about 3.1 per cent. of men and 0.7 per cent. of women. Some degree of color blindness occurs in 8.6 per cent. of men and 2.2 per cent. of women.

Curing Flat-Foot. It is a safe and true saying and quite beyond dispute that any soldier's efficiency is only equal to and parallel with the integrity and soundness of his feet. Thus G. H. R. Gosman and H. P. Perry[3] begin a description of the method by which they cured 80 per cent. of a group of 300 soldiers afflicted with flat feet.

The shoes and stockings are removed and the drawers and breeches are made loose enough not to restrain the

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(1) Amer. Jour. Med. Sci., October, 1917.
(2) U. S. Pub. Health Rep. Bull. No. 92.
(3) Military Surg., January, 1918.

muscles. The man stands on a 2-inch plank with the toes projecting beyond the edge. The toes are flexed to the limit of capacity. The flexor muscles of the soles are made to pull hard. This is followed by extension without effort. This exercise is continued for from five to ten minutes. Next the toes and foot are flexed, the toes are turned in and the foot is inverted. At the end of the inversion, adduction and flexion, the muscles employed are given a hard pull. The foot is permitted to resume the usual position with a minimum of muscle effort. This exercise is repeated for 10 minutes.

Later, the time consumed in the two exercises is extended to 30 minutes a day; still later, and 30 minutes in the morning and 15 minutes at night are given to the exercises. The man is instructed voluntarily to walk pigeon-toed all the time until his cure is complete.

The authors advise every person who walks with his toes turned out and every person with flat foot to use these exercises whether he or she has symptoms of flat-foot, since every patient with flat-foot will develop symptoms under strain, and walking with the toes turned out is an ineffective way of walking.

HYGIENE OF SCHOOL CHILDREN.

Undernourished School Children. E. H. Lewinski-Corwin,[4] with the approval of the Health Committee of the New York Academy of Medicine, prepared a report on the malnutrition of school children in which it is stated that in 1917 of 224,963 school children examined 9.9 were found undernourished. The children were graded on the Dumferline scale or into classes: 1, Excellence; 2, normal; 3, below normal; 4, very bad. As to scales and weights for school children of different ages the report says that the Bowditch and Baldwin scales are not good, and that the Boas scale is the best.

The causes of malnutrition are divided into external and internal. In the first are such environmental causes as wages, amount of money spent on the family (which may be quite out of proportion to wages), housing, and

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(4) Med. Record, Feb. 23, 1918.

food. In the second are such intrinsic causes as bad tonsils, bad teeth, mouth breathing, respiratory and digestive troubles.

Among the remedies recommended are: (1) Clinics for undernourished children; (2) fresh air classes; (3) tuberculosis preventoria; (4) school lunches; (5) diet kitchens; (6) baby welfare stations; (7) fresh air funds; (8) education.

The report recommends that every school be equipped with weighing scales and facilities for measuring height and that the school nurse follow up cases of malnutrition closely. The committee found a relation between malnutrition in children and the foundations of consumption.

Child Welfare in France. The *Journal de médicine de Bordeaux*[5] gives the methods of infant welfare work being conducted in France by the American Red Cross.

A. Protection During Pregnancy:

1. Organized hospital and dispensary consultations offer their services to all pregnant women.

2. Pregnant women suffering from grave troubles are cared for in maternity hospitals or in their homes by specialists and nurses.

3. Unattached females, including the illegitimately pregnant, are cared for in special asylums.

4. The young children of pregnant women who must be cared for in institutions will either be cared for in homes or placed in private families.

5. Working pregnant women will be helped to get promptly the funds due them under the Strauss law. This law insures a pregnant woman money enough that she may rest during the last month of her pregnancy. Pregnant women who need rest and can not get it under the Strauss law shall be given money enough to permit them to rest.

6. To see that all pregnant women get enough food and a good place to live in.

7. Education of all mothers.

B. Protection During Confinement:

1. All women whose labors are complicated or who can not be cared for at home are to be cared for in maternity hospital or else a midwife furnished.

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(5) February, 1918.

2. Women who can be confined at home will be furnished the services of specialists and such other help as they need.

3. Other children will be better taken care of during confinement.

4. Education.

C. Protection During Period of Nursing.

1. Sick mothers will be given care with their babies in hospitals or else service will be supplied them at home.

2. For women with prolonged convalescence care for themselves and their babies will be given in convalescent hospitals.

3. For nursing mothers without proper homes beds in homes will be provided.

4. For sick and debilitated infants care will be given in baby hospitals or it will be furnished at home.

5. For the children of sick mothers places in baby hospitals or appropriate care elsewhere.

6. For all nursing mothers a guarantee of good food and care. Either a four-weeks' rest period or some help that seems better.

7. All nursing mothers, whether they work or not, proper living conditions.

8. Encourage mothers to rest during first month.

9. For women who must work away from home places where they can go and nurse their babies.

10. For women who work out and whose babies are artificially fed, crèches and a proper milk supply.

11. Infant welfare stations for all women and all babies.

12. Homes and care for neglected babies.

13. Education.

Controlling Contagion in Schools. With a view to the control of contagion in schools H. M. Fletcher(6) proposes that all schools be equipped with a steam spray outfit such as has been devised by Gordon and Flack for the control of meningitis. This apparatus throws a very fine spray or fog which the subjects inhale. Fletcher has used a 1.25 per cent. solution of zinc sulphate. Where this is not available he irrigates the mouth and nose with a 1 to 4,000 solution of potassium permanganate. Using these methods, Fletcher has controlled epidemics of measles and other forms of contagion in several schools and hospitals.

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(6) Brit. Med. Jour., March 16, 1918.

CONTAGIOUS DISEASES.

Protecting Contacts Against Infection. Milne[7] recounts his experience in controlling an outbreak of measles in a home in which there were 600 children. In the home there are fourteen houses each being occupied by about forty boys. One other house was used as a temporary hospital and still another as a detention house. The first patient was admitted on November 7 and sent to the detention house. On November 9, he broke out with measles. Two other boys developed measles in the detention home, one on November 19 and the other on November 21. By December 10, they were out of quarantine and the epidemic in this house was over. But on November 8, no contagion being expected, a boy was passed from the detention home to the general group. He developed measles on November 22, and exposed the boys in his house and in seven other houses; eleven cases of measles developed in these houses between December 1 and 8. Between December 15 and December 22, there were fourteen cases. After December 24 there were three cases. In all there were thirty-two cases distributed in thirteen different cottages. Of the 563 boys investigated 367 had never had measles.

The method of protection employed was that devised by Dr. Robert Milne, father of the reporter. The Milne method is as follows:

A. Every contact and every child who may become exposed has 10 drops of pure eucalyptus oil dropped on his shirt directly below his nose in the morning and again at noon and also on his nightshirt before he retires. Care of cases: Each measles patient is rubbed with eucalyptus oil—the scalp as well as the remainder of skin being covered—twice a day for four days and then once a day for six days, before being allowed to associate with other children.

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(7) Practitioner, April, 1918.

B. The throat is gently swabbed with 10 per cent. phenol every four hours for three or four days. The swabbing must be well done.

C. Patients in the active stage must have the head covered with gauze. The gauze covers the head and neck and is sprayed with eucalyptus oil every four hours. The use of the gauze is continued so long as the cough persists.

On December 4, instructions were given to institute the Milne treatment, applying it to all cases and also the preventive provisions to all the boys. It was predicted that no cases would develop after December 24.

Only three developed after that date and it was found that they had not systematically used eucalyptus oil. During Christmas week the boys mixed in the dining rooms and also visited the surrounding country.

[In the earlier days of the war, the French reported some experiences in caring for different types of contagion in a hospital ward. They got no cross infections. They employed the Milne method.—Ed.]

Face Masks to Prevent Infection of Contacts. G. H. Weaver[8] describes the mask that has proved successful in controlling contagion in Durand Hospital. It consists of a double thickness of gauze so shaped as to fit closely over the face from the chin well up over the nose and held in position by two tapes tied behind the head. A mask is never worn twice unless it has been sterilized and washed and is always replaced by a fresh one when evidently contaminated or when it becomes moist. All nurses and physicians wear the masks. The possibility of distant aerial transmission of all contagion except measles and chickenpox is ignored. The doors to rooms occupied by patients with these diseases are kept closed. The use of face masks has materially lessened the development of diphtheria carriers among nurses. Cases of diphtheria had previously been wholly eliminated by the use of the Schick reaction followed by vaccination of the reactors. Use of the face mask wholly eliminated scarlet fever among the nurses for a period of eighteen months.

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(8) Jour. Amer. Med. Ass'n., June 12, 1918.

J. A. Capps[9] describes the methods of preventing cross infection employed at Camp Grant. Essentially his method consisted in masking the patient as well as the physicians, nurses and other attendants.

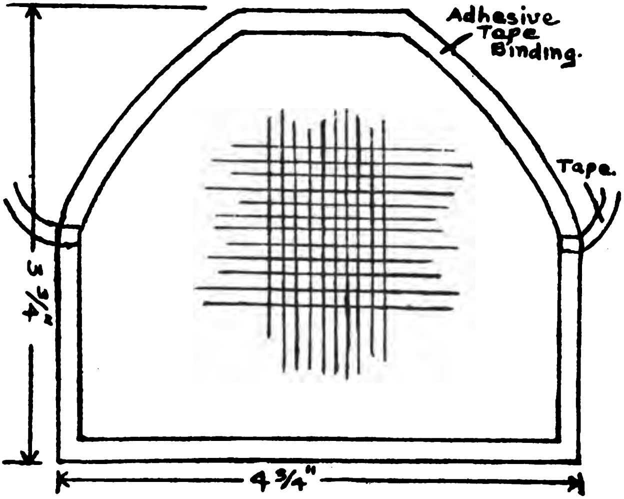

Fig. 5—Diagram for construction of face mask.

Rules of Contagious Wards:

1. A face mask must be worn continuously by all patients when out of the cubicle (Fig. 5).
2. In the latrine the mask may be removed only by permission and under the direct supervision of ward nurse.
3. Wash basins and bathtubs are not to be used. For washing face and brushing teeth use running water over sink. Shower may be used under supervision. Use only liquid soap from container.
4. Only one patient will be allowed in the washroom at a time. Remove mask on entering and replace before leaving washroom.
5. Masks may be removed when patients are in bed.
6. Sheets between beds are not to be drawn back.
7. No smoking allowed.

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(9) Jour. Amer. Med. Ass'n., March 30, 1918.

8. Corps men, nurses and surgeons should wear masks and gowns when on duty in the ward (Fig. 6). A guard should be on duty continually near the washroom.

All eating utensils should be sterilized after each meal. The patients suspected of having contagion are made to put on a face mask at the regimental sick call. They must wear this mask in the ambulance and until the bed in the hospital is reached.

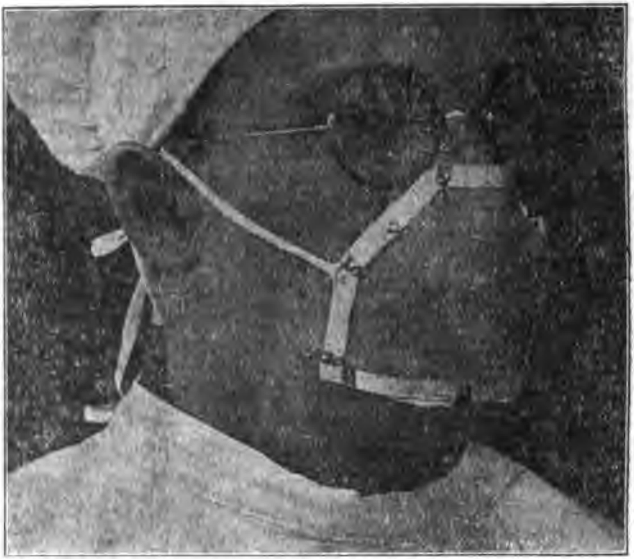

Fig. 6—Side view of face mask.

The hospital ward is divided into cubicles by curtains suspended from wires.

The method appeared to be entirely successful in preventing cross infections at the time the progress report was made.

Dannenberg[1] describes a gauze face mask in use in Camp Jackson. A piece of galvanized wire mesh is cut as in Fig. 1. The edges are bound with adhesive strips. The wire is covered with cloth gauze which is neither

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(1) Jour. Amer. Med. Ass'n., April 6, 1918.

sewed to the wire or fastened on with clips. The mask is then moulded to fit the nose and mouth. A tape runs from the side of the mask over the ears and behind the neck. The cloth is readily removed from the wire if it is held in position by clips.

D. A. Haller and R. C. Colwell,[2] finding great difference in the face masks furnished to Camp Grant and used there for the control of contagion made some investigations and based on these they advise that face masks should be 8x5 inches with the edges turned in and stitched. There should be two tapes each one a yard long; 8 inches of each braid should be stitched to the edge of the mask. This will leave a tape 14 inches long at each corner. A black thread sewed on one side should indicate the side to be worn next the face. The gauze of the quality Lakeside 24x20 or L & L 28x24 or B & B 32x36 should be used in three layers. Lakeside 24x20 gauze should be in 7 layers. L & L 26x24 should be in 6 layers and B & B 32x36 should be in 5 layers. The number of layers should be regulated by the size of the mesh the gauze.

B. C. Doust and A. B. Lyon[3] think that buttercloth in three layers makes an effective mask. The cost of a mask irrespective of labor is three or four cents. Buttercloth sells at 14 cents a yard and a yard will make nine masks three layers thick.

In ordinary conversation, mouth bacteria are projected less than 4 feet. Coughing projects bacteria 10 feet into the air. Coarse gauze masks will not stop bacteria projected by coughing not even when the cloth is in ten layers. Three layers of buttercloth suffice.

Experiments made to determine the efficacy of face masks lead G. H. Weaver[4] that a mask composed of three thicknesses of 44x40 gauze is effective in removing bacteria from the mouth sprays in ordinary cases of infection. Where the infection is very virulent he has the attendant wear two masks or six thicknesses of gauze. He thinks an absorbent gauze better than

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(2) Jour. Amer. Med. Ass'n., Oct. 12, 1918.
(3) Ibid.
(4) Ibid, Oct. 26, 1918.

buttercloth. The absorbent feature is an advantage. The only buttercloth he was able to obtain had a weave of 28x30 and that is too coarse. Besides the chemical which makes buttercloth non-absorbent washes out. Wet gauze is just as effective as dry in removing bacteria. Even two layers of 20x14 gauze removed 25 per cent. of the bacteria when the most violent blowing effort possible was made. Eight layers of the same mesh removed 95 per cent. of them. Six layers of 24x20 removed 90 per cent. of them. Four layers of 32x28 removed 75 per cent. of them and four layers of 44x40 removed 96 per cent. of them.

When attendants wear gauze masks they keep their hands away from the mouth and nose. No one realizes how many times a day a hand is carried heedlessly to the mouth or nose. From March, 1913, to November, 1914, 13 per cent. of the Durand nurses contracted diphtheria. Testing with the Schick test and vaccination of the susceptibles ended cases of diphtheria in the nursing staff but it was found that 23.25 per cent. of the nurses were diphtheria carriers. The addition of face masks to the equipment technique had reduced the percentage of carriers to 5.2 per cent. In the earlier days of the hospital 8 per cent. of the nurses contracted scarlet fever. No case of scarlet fever has developed among the nurses since the use of face masks was adopted.

[The wearing of face masks as a means of preventing cross infections represents a genuine gain. While it did not originate in the army, the cantonments furnished a fine opportunity to demonstrate the efficacy of the method. It rapidly came into almost general use in the camps in preventing contact infections in measles, scarlet fever, meningitis, pneumonia and diphtheria. It may find a field in the prevention of colds. It is to be hoped that civilian health departments will make its use general in all contagious disease hospitals this winter, and that before long civilians may use it generally as a means of preventing infections, especially infections with colds.

The Milne method combined the use of a mask, washing the nose and throat and saturating the air with eucalyptus. Milne unquestionably stressed the efficacy of the drug. It is possible that a plain mask would have done as well. Health authorities, in insisting that a handkerchief be held before the mouth when sneezing and coughing, were on the same track. These facts, however, do not lessen the credit due Weaver for the face mask. Let us hope that this opens the way for the control of air as a means of disease communication just as water and milk and other foods have been controlled. The discovery that pathogenic bacteria were not transported more than a few feet by air brought such control into the realm of the possible.—ED.]

Cross-Infections in Cook County Hospitals. Armstrong[2] deduces some worth while conclusions from his large experience in the contagious disease wards of Chicago. In 4,874 cases of communicable disease he had 280 crossed infections or 5.74 per cent. Measles led with 132; chickenpox furnished 120; diphtheria 17; scarlet fever 9; German measles, 5, and mumps 6 of the cases. The most serious form of crossed infection was scarlet fever, since the disease in the northern cities of the United States has a death-rate of from 2 to 8 per cent. Diphtheria developing in a hospital is a disease of rather minor importance unless it develops in the larnyx. Measles is of some consequence because of the tendency to complications and because of the difficulty in controlling it. Whooping cough is of some importance if there are babies in the ward. It is fairly well controlled by vaccine. Of persons occupying beds in a civil communicable disease hospital located in a city, 75 per cent. are under 10 years of age; 50 per cent. are under 5 years of age. An investigation of 524 normal children between 5 and 10 years of age inclusive showed that 21 per cent. had not had measles, 62 per cent. had not had chickenpox, 51 per cent. had not had whooping cough, 91.5 per cent. had not had diphtheria and 86.5 per cent. had not had scarlet fever. The greatest number of infections occurred in those ill with or convalescing from scarlet fever; diphtheria was next. Children recovering from measles rarely develop cross infections. Cases of poliomyelitis rarely develop cross infection nor does poliomyelitis develop as a cross infection in hospitals for children

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(2) Interstate Med. Jour., March, 1918.

or among attendants caring for the disease. The great frequence of cross infections among scarlet fever and diphtheria convalescents is probably due to the length of the convalescence period. Scarlet fever and diphtheria rarely develop in nurses after their first days on duty in the contagious wards. In Cook County hospital, the largest number of cases of scarlet fever and diphtheria in attendants occurs among those working in general and not in contagious-disease wards. For protection against diphtheria he uses antitoxin for immediate service and the von Behring vaccination for prolonged immunity. The Schick test is used. It is his opinion that contagion is spread almost solely by contact. The indirect contact through attendants is the largest single factor by far. To prevent it great care must be exercised in training attendants and then discipline must be rigid.

Typhoid in American Cities. The *Journal of the American Medical Association*[3] presents its sixth annual report on the mortality of American cities from typhoid fever. Let us hope that they may soon inaugurate a similar plan for stimulating a friendly rivalry between the different states.

The honor for having the lowest typhoid rate goes to Chicago with 1.7 per 100,000; Oakland, California, is second with a rate of 1.9. Both of these cities pasteurize their milk. St. Paul, Minnesota, is third; Tacoma, Washington, fourth, and Boston fifth. Fourteen cities have rates lower than 5; twenty-three have rates between 5 and 10; only four have ratings over 20, and only one, Birmingham, has a rate over 30.

Three years ago thirteen cities had rates over 20. At that time only four cities, as compared with the present fourteen, had rates less than 5. The average rate for all the cities fell from 7.61 in 1916 to 6.65 in 1917.

In the sixty cities in which over 25 million people live there were only 1,812 deaths from typhoid fever. In 1898, many more than that number died from that disease in our small army. In 1917 practically none died in our large army from typhoid. This greater improvement warrants us in hoping that the *Journal* may soon establish a "Super 1 Group" for cities with a typhoid

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(3) March 10, 1918.

rate of under 1. Perhaps before long the rural districts and the smaller cities can begin to get into Class 2—over 5 and under 10.

When the cities are grouped according to size, we find the highest and the lowest three in each group to be as follows:

Over 500,000—Lowest, Chicago, Boston, New York; highest, Detroit, Baltimore, Pittsburgh.

From 300,000 to 500,000—Lowest, Newark, Cincinnati, San Francisco; highest, New Orleans, Washington, Buffalo.

From 200,000 to 300,000—Lowest, St. Paul, Rochester, N. Y., Jersey City, N. J.; highest, Louisville, Kansas City, Indianapolis.

From 100,000 to 200,000—Lowest, Oakland, Worcester, Scranton; highest, Birmingham, Memphis, Fall River.

From 100,000 to 125,000—Lowest, Tacoma, Camden, Cambridge; highest, San Antonio, Dallas and Nashville.

Control of Typhoid in Chicago. Chicago's almost complete mastery of typhoid fever and the methods employed are related by H. S. Spalding and H. N. Bundesen.[4] This has been accomplished without the use of typhoid vaccination. The sewage has been diverted so that but little of it gets into Lake Michigan. Very careful and complete provision to prevent pollution of the water-supply has been made and yet, since there will always be breaks in even the most perfect systems, the water is chlorinated. The dosage is usually about 15 hundredths part per million, but it ranges from one to two-tenths part per million according to the condition of the water.

In 1917 less than 0.1 per cent. of the samples showed *B. Coli* in ice or water.

In Chicago, if typhoid fever is reported, a Widal diagnosis is made; all nurses caring for typhoid must be immunized. The family are urged to be. The patient is isolated and the dejecta disinfected. The attendant must have nothing to do with the family cooking, care of children or handling of food. There must be a water closet for the exclusive use of the patient's family. The family must be sufficiently intelligent, willing and so

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(4) Amer. Jour. Pub. Health, May, 1918.

housed and located as to be able to carry out the rules. Unless these rules are adhered to the case is hospitalized.

Cases are terminated by bacteriologic examination of the feces and urine. If the patient goes to a hospital the nurse attending that case is not permitted to attend patients with any disease other than typhoid. Typhoid patients are not cared for in wards with other diseases. Carriers are held under quarantine until their dejecta are found to be free from typhoid bacilli. On the spot maps the cases are spotted according to the water-supply, but milk and all other sources of contagion are carefully studied.

[Chicago's typhoid rate was gotten about as low as it can be pushed without the extensive use of vaccine. The largest single factor in this result was the diversion of sewage, the long terminal water system, chlorination and other works resulting in a practically pure water-supply. The second largest factor was universal pasteurization of milk. The great reduction in contact infection is the third largest factor. The control of other food and of flies have contributed. But a considerable part of the population travel in and out of town. Carriers abound and there are breaks in even the best systems. Therefore, further material reduction will wait on vaccination. With the decrease in cases there comes a decrease in the danger of infection of water, milk, vegetables, flies and a decreased possibility of contact infections. As the general typhoid rate lowers and as the great typhoid foci (such as certain large cities ten years ago) cease to be such, the amount of typhoid fed into a city like Chicago can be expected to decrease. It is not likely that typhoid vaccination for the general population will ever be advisable.—ED.]

Typhoid in the British Army. C. W. Saleeby[5] says that 97 per cent. of the British forces in France and Belgium had been vaccinated against typhoid by April, 1917. Up to 1917, the typhoid rate of the unvaccinated was sixteen times that of the vaccinated. The rate of the non-protected was 9.9, of the protected 0.6. The death ratios were 1.94 per 1,000 and 0.3.

He argues for metal helmets, eye-guards and metal

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(5) Jour. State Med., October, 1917.

plates to be worn over the vital organs. The shields and helmets should be of manganese steel. The shape of the helmet should receive careful consideration. Those now used by the British he regards as about right.

[Insofar as these figures apply, they seem to show that sanitation rigidly enforced can reduce a typhoid death-rate in an army to 1.94 per 1,000—when the army has been rapidly thrown together and fights under the conditions which prevail on the Western front. Further material reduction will depend on vaccination. The United States Army has achieved better rates in each of their subdivisions, but it must be remembered that they were under more favorable conditions.—ED.]

Typhoid Vaccine in Oil. *The British Medical Journal*[6] speaks hopefully of a typhoid lipo vaccine described in 1916 by Le Moignic and Pinoy and further written about by L. Triboundeau.[7] The vaccine produces immunity when injected as a single dose. The dose is 1 c.cm. containing seven thousand million of typhoid and paratyphoid *A* and *B* mixed in equal parts in oil. The mixture is almost free from reactions. This is due to the fact that toxins and poisons when mixed with oil for the most part lose the power of affecting the nervous system.

Lipo-vaccines. Vaccine material dissolved in oil is less toxic than that dissolved in salt solution. This quality may make it possible to vaccinate against diseases not now vaccinated against. This may be true of dysentery. Lipo-vaccines absorb more slowly and thus the action is spread over a much longer time. This quality may be of advantage in meningococcus vaccination. The use of vaccines suspended in oil permits of vaccination at one sitting. This quality makes it of value in vaccinating an army against typhoid and paratyphoid. And the vaccine is not so liable to deteriorate. As against these advantages there is the disadvantage of added cost and greater difficulty of production.

E. R. Whitmore, E. A. Fennel and W. F. Peterson[8]

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(6) Feb. 23, 1918.
(7) Comp. rend. Soc. de Biol., Paris, 1917, lxxx, 782; Archiv. méd. et Pharm., Naval, Paris, 1917, civ, 276.
(8) Jour. Amer. Med. Ass'n., Feb. 17, 1918.

report the preparation of lipo-vaccines of typhoid, paratyphoid, pneumococcus, meningococcus and dysentery. The typhoid-paratyphoid vaccination given in one injection seemed to give protection equal to that of vaccination done in the usual manner. They draw no conclusions as to the value of the pneumococcus vaccine.

The experiments with meningococcus and dysentery vaccination show the feasibility of vaccination against these diseases, but no conclusion as to the efficacy of the procedure can be drawn. The vaccine is suspended in some vegetable oil. Up to now the authors are sterilizing with heat and using no preservative. However, they suggest the possibility of using iodine. In giving the vaccine the skin is painted with iodine and the vaccine is warmed to 37° C. and injected through a large bore needle. Some of the oil is liable to flow out through the needle puncture. To prevent this a small iodine swab is pressed against the puncture.

E. R. Whitmore and E. A. Fennel[9] in a later article report continuation of their experiments with lipo-vaccines. They give the method of growing, collecting and drying the cultures. The bacteria are emulsified with lanolin, lecithin or sperm oil and then mixed with olive oil, sweet almond oil, caster oil, cotton seed oil or sesame oil. The oil is sterilized by heat. Then the mixture is made and the final sterilization is done. The injection is done with a needle No. 21 B and S gauge with a canula three-fourths inch long. Care is taken to prevent injection into a vein.

Typhoid Due to Eating Turkey Salad. P. S. Schenck[1] reports an epidemic of typhoid fever consisting of twelve cases which apparently resulted from eating turkey salad at a reception. Apparently, though the facts were not fully proved or investigated, the salad was infected by a cook's helper who was convalescent from typhoid when she assisted in preparing the food for the reception.

Treating Typhoid Carriers. L. Prete[2] suggests a method of treating carriers of typhoid bacilli. He gave

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(9) Jour. Amer. Med. Ass'n., March 30, 1918.
(1) Jour. Amer. Med. Ass'n., Oct. 27, 1917.
(2) Amer. Jour. Pub. Health, May, 1918; Riforma Med., xxxiii, p. 973, 1917.

such cases a small injection of antityphoid vaccine. This produced a pronounced general reaction and increased the agglutinins in the blood and secretions. This increase in agglutinins caused the bacilli to disappear from the excreta.

Malaria in California. S. B. Freeborn[1] tells us that rice culture is spreading rapidly in California. Incidentally, it is causing infection with malaria and infestation with mosquitoes. The great difficulty of the situation results because the usual agents for destroying mosquitoe larvae lessen the production of rice. Freeborn suggests that the breeding of dragon flies and top minnows be encouraged, but that especial attention be given to all mosquito breeding places outside the areas of rice field flooding. The mosquitoes breed in these places for a month or more before and an equal length of time after the season of field irrigation.

Grass Powder as a Substitute for Oil. Thibault[2] reports excellent results from the use of ordinary grass-and-weeds powders for spraying water as a larvacide for mosquitoes. Pyretheum powder when used as a larvacide for mosquitoes acts mechanically and only mechanically. Thibault gathered up ordinary grass and weeds, dried them thoroughly and ground them into fine powder. When this power was blown onto the surface of water it killed the mosquito larva in the water. A good powder should spread well and remain dry some time. A pound of powder should cover 3,500 to 4,000 square feet of water. The powder becomes ineffective when it takes up water. This method is not very good for *culex.* It is most effective with those species whose larvae have short thick air tubes. The powder is not so effective as oil; when oil can be used to form a film it should be employed.

Control of Malaria by Prophylactic Quinine. H. R. Carter[3] does not think the use of prophylactic quinine as efficacious as screening, minor drainage or major drainage, but it is nevertheless a commendable method. It consists in taking a daily dose of from 5 to 7 grains of

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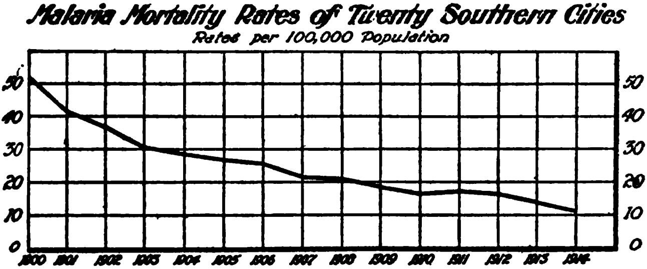
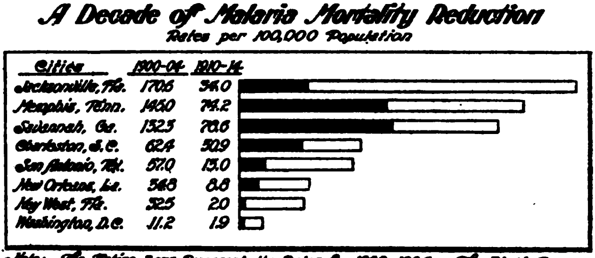
(1) California State Jour. Med., September, 1917.
(2) Jour. Amer. Med. Ass'n., April 27, 1918.
(3) U. S. Pub. Health Rep., Reprint No. 454.

quinine from June 1 to November 1. In the far South, it will be found advisable to begin earlier and to continue later. The less soluble salts of quinine are best, but if the tannate be used the dose should be doubled. To test the solubility of quinine pills and tablets drop one into a glass of water. If at the end of ten minutes it has crumbled considerably the batch is in condition to be absorbed from the digestive tract. When the method is employed in an intensely malarial region it is advisable to make use of a larger dose of quinine, say from 7 to 10 grains, while in sections where there is not much malaria a daily dose of 2½ grains may suffice. Following this method, the Italians reduced the number of deaths from malaria from an average of 14,048 to one of 3,853 per annum. The cases of malaria in the Roman marshes was reduced from 11,653 to 2,974 yearly.

Decrease in Malaria in Southern Cities. Diagrams (Figs. 7 and 8) prepared by the Statisticians De-

Fig. 7.





Note: The Entire Bars Represent the Rates for 1900-1904; The Black Bars Represent the Rates for 1910-1914.

Fig. 8.

partment of the Prudential Insurance Company illustrate the decrease in malaria in certain southern cities. Approximately the same rate of decrease holds throughout the southern malaria belt.

Dengue. J. B. B. Cleland and P. Bradley[4] investigated dengue in Australia. This disease was imported into Australia in 1884 and has been endemic in portions of Australia since that time. They found that *stegomyia fasciata* mosquitoes caught in a dengue-infected district, some of them known to have fed on patients with dengue on the first and second days of the disease, transported to a non-dengue district and there allowed to bite seven persons caused four of the seven to develop dengue. The incubation period was found to vary between five and nine and one-half days. No cases were caused by bites of *Culex fatigans*. No cases developed among persons in contact with induced cases.

The blood of persons suffering from dengue is capable of causing the disease when injected subcutaneously. The experiments show that the virus is present on the second and third days of the disease. It may be present on the eighth day. It is not present on the fourteenth day. Immunity is complete twenty-four days after recovery from the disease. Infected blood retains its infectivity outside the body for at least seven days if kept cool. Dengue fever has close analogies to yellow fever.

Dysentery from Infection Through Feces. E. R. Whitmore[5] calls attention to the fact that examination of feces for dysentery bacilli and in somewhat lesser measure for *Entamoeba hystolytica* must be made on the ground. If the examination be delayed, results will be negative. Bacillary dysentery due to the Shiga bacillus, whether in adults or children, is a very severe disease—as fatal as cholera. Serum should be given intravenously in 100 c.c. doses. It is not necessary or advisable to give Shiga serum in bacillary dysentery due to the Flexner or the "Y" type of non-toxic dysentery.

In the discussion of Dr. Whitman's paper, Dr. V. C. Vaughan called attention to the fact that in the war of 1898 while 15 per cent. of the dysentery and typhoid in-

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(4) Jour. Hygiene, January, 1918.
(5) Penn. Med. Jour., February, 1918.

fections were due to flies, 64 per cent. were due to contact and finger infections. Whitmore says that from 20 to 25 per cent. of dysenteries on the Eastern Front in this war are due to the ameba. He says that in the American army amebic dysentery causes more deaths and invalidism than does the Shiga dysentery. Owing to war conditions, amebic dysentery is liable to be widely spread throughout America.

C. F. Craig[6] found that most of the cases developing in the army along the Rio Grande in 1916 were infected from carriers. Whitmore quotes from the Report of the Medical Research Committee of the United Kingdom (His Majesty's Stat. Office, London, 1917) and Wenyon and O'Connor (*Jour. Royal Army Med. Corps,* 1917) to the effect that from 10 to 15 per cent. of the men who have been in the tropics for from six months to a year are carriers of *Entamoeba histolytica* regardless of whether they have been ill with dysentery or not. The cysts passed in the stools are capable of causing virulent dysentery. Ameba cysts are promptly killed by drying. Chlorine in water, 1 to 10,000, will not kill them in one hour. They will live in stored water for more than a month. When ingested by flies, they pass out into fly spots within forty-eight hours. They are alive and virulent when thus passed. Amebas and worm ova have been found in the intestines of flies. Whitmore advises that patients with amebic dysentery be treated up with emetine until the dysentery has stopped, and that carriers be cleared up with bismuth and emetine iodide. Patients who can not be thus cleared up are to be sent back to their commands, if soldiers, but they must not be allowed to handle food.

In the use of emetine we must be cautious. Not over 10 grains must be used in one course. Emetine produces toxemia, one symptom of which is diarrhea. Another symptom is edema in various localities. When diarrhea develops, the physician is apt to think the infection is recurring and continue the use and even increase the dose of emetine; therefore, the need of caution. In clearing carriers the emetine bismuth iodide is both safer and more efficient.

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(6) Military Surg., December, 1917.

Brill's Disease in Paris. Netter[1] reports several cases of quite typical typhus fever developing in Paris in refugees dispossessed of their lodgings by the war. On further investigation he found evidence of Brill's disease in Paris. He says that in the sections of the Seine and Somme districts typhus has been existent for years. It has lost all of its old characteristics and is now a Brill's disease or attenuated typhus. Both diseases are spread by lice. There is practically no danger of an extensive outbreak of typhus due to the presence of this disease.

Control of Lice. A further contribution to methods of louse control is made by W. Moore.[2] The best powder in his opinion is composed of talc, 20; creosote, 1; sulpher, ½. This is more effective and less irritating than N. C. I. powder. The objection to powders is the cost of a supply ample for an army. Lice will leave clothes impregnated with oils, but this is of little service practically because oil soaked garments are uncomfortable. A cheese-cloth suit impregnated with a saturated solution of sulphur in creosote worn outside the underwear should prove effective. If clothing is put through a fumigator in which there are fumes of chloropicrin (4 c.c. to each cubic foot) for 30 minutes all lice and nits will be killed. By raising the temperature the time of exposure can be shortened. The person running the fumigator should wear a mask.

Killing Lice by Heat. A. Bacot[3] suggests that stearin in pots be used as a means of checking the temperature of sterilizing huts and to kill lice and destroy nits. The sterilized huts are equipped with electric fans to distribute the heat throughout the hut. He noted that a hut without fans once had a temperature of 140° F. at one level, 72° F. at the floor level and 216° F. at the ceiling. A temperature of 125° F. for fifteen minutes will kill lice and destroy nits. To test the temperature in the huts, Bacot made use of porcelain jars 2½ inches deep and 2½ inches in diameter. These were filled with stearin which would completely melt at 140° F. in 30 minutes. The amount of stearin contained in a jar was

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(1) Bull. de l'acad. de méd, Jan. 29, 1918.
(2) Jour. Lab. and Clin. Med., February, 1918.
(3) Brit. Med. Jour., Aug. 4, 1917.

110 grains. Several of these pots were exposed at different points in the sterilizing hut. If the stearin was completely melted it was certain that all lice and eggs were killed.

Another Way to Kill Lice. A. W. Bacot and L. Lloyd[4] found that steeping clothes in a 2 per cent. solution of lysol or cresol soap for 20 minutes at a temperature above 50° F. kills nits.

Lice and Infection. William Moore[5] found that persons when bitten by a large number of lice developed fever and other symptoms of intoxication. This was due to toxemia from the bites and not to any form of infection. The fever might possibly be mistaken for trench fever.

The Health of the Army. As was predicted a year ago our Army in training was practically free from all diseases that are commonly vaccinated against. There was practical freedom from diseases which result from bad sanitation. But they suffered considerably from common colds, bronchitis, pneumonia, pleurisy, empyema, meningitis and measles.

V. C. Vaughan[1] hopes that in the winter of 1918-19 we will not duplicate our mistakes of the winter of 1917-18. He hopes especially that we will prevent the measles and pneumonia incidence among our soldiers in training last winter. He says:

"Inspection of our camps and our hospitals leaves one with the impression that so far as their medical personnel is concerned the greatest need is for men skilled in the early recognition and the handling of the acute respiratory diseases." He quotes the Surgeon-General as asking:

1. That deficiencies in clothing be made good.
2. That additional tentage and housing be provided sufficient to give each soldier at least 50 square feet of floor space.
3. That a detention camp be established with each division and that all arrivals shall be held therein for a proper length of time.

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(4) Brit. Med. Jour., April 27, 1918.
(5) Jour. Amer. Med. Ass'n., Nov. 2, 1918.
(1) Jour. Lab. and Clin. Med., January, 1918.

4. That a quarantine camp for contacts, suspects and carriers be established for each division.
5. That epidemiologists be provided.
6. That ample hospitals be provided.
7. That provision be made for laying the dust in each camp.

Respiratory Diseases in the Training Camps. L. C. Duncan[2] says that the young men of the Gulf states are peculiarly susceptible to pneumonia. Poor physique, hookworm and malaria increase this susceptibility. So uncontrollable does he hold measles to be that he says: "When recruits from the Southern states are mobilized in the summer time it is advisable to allow measles to spread until all have had it. In the winter measles will probably spread in any event. Crowding of recruits is one of the fruitful causes of spread." He intimates strongly that the troops in Southern camps in the winter of 1917-18 were not given enough clothing nor made comfortable in houses. So far as the treatment of pneumonia was concerned he saw no advance. "The mortality is still 20 per cent., as it was 50 years ago." He contends that pneumonia is an infectious disease and that all pneumonia patients should be segregated and kept so until they are no longer carriers.

Vaccination Against Pneumonia. R. L. Cecil and J. H. Austin[3] vaccinated something more than 12,519 soldiers against pneumonia. Three or four doses were given at intervals of from five to seven days, with a total dosage of from six to nine billions of Types I. and II. and from four and one-half to six billions of Type III. In the ten weeks that elapsed after the vaccination no pneumonias due to Types I., II. and III. have developed. In a control of 20,000 unvaccinated troops there were twenty-six cases of Types I., II. and III pneumonias. The incidence of pneumonia due to Type IV. streptococci was much less among the vaccinated than among the unvaccinated troops. There were some objectionable local reactions at the point of injection in

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(2) Military Surgeon, February, 1918.
(3) Jour. Exp. Med., July, 1918.

some cases indicating a cutaneous hypersusceptibility.[4]

A Mouth Wash as a Protection Against Pneumonia. J. A. Kolmer and E. Steinfeld[5] suggest the use of quinine and other solutions as mouth washes and gargles for pneumococcus carriers. A dilution of 1 to 10,000 ethylhydrocuprein hydrochlorid, quinine bisulphate, quinine hydrobromide or other cinchona preparations in 1 to 10 liquor thymolis may be used. The bitter after-taste is removed by rinsing in plain water. Similar solutions using Dobell's as a base can be used as a nasal douche. The cinchona preparations may be incorporated in dental creams. The writers suggest that all convalescents from pneumonia and measles and all persons in contact with these diseases use these gargles and washes twice a day.[6]

Pneumococci in Common Colds. Eugenia Valentine[7] examined the nose organisms for presence of pneumococci in forty-three cases of common colds. Two cases were due to Type I. pneumococci, two to Type II., four to Type III. and thirty-five to Type IV. The two patients with Type II. organism and one of those with Type III. had been in contact with cases of pneumonia. None of the others had been.

Cubicles for Pneumonia Patients. E. Swann[8] says that crowding is a very considerable factor in the spread of pneumonia, measles and mumps in barracks. In handling pneumonia in wards he advises that the beds be not crowded, sheets be used to wall off each bed and the same precautions be taken as are used in the control of other forms of contagion.

Influenza. Influenza is one of the oldest of the pandemic diseases the facts as to an epidemic in Italy, Germany and Britain in 1773 being well established. Four pandemics occurred in the last century according to C. W. Darling.[9] The dates were 1830-33, 1836-37,

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(4) See Lister F. S., publications of the South African Institute for Medical Research No. X., 1917, also ibid No. 8, 1916, also ibid, No. 2, 1913.

(5) Jour. Amer. Med. Ass'n., Jan. 5, 1918.

(6) See also Jour. Med. Research, March, 1918.

(7) Jour. Exp. Med., January, 1918.

(8) Buffalo Med. Jour., May, 1918.

(9) Amer. Jour. Pub. Health, October, 1918.

1847-48 and 1889-90. Each pandemic was followed for several years by epidemics or sporadic outbreaks.

The pandemic of 1889-90 started somewhere in the Far East in the Spring of 1889, it reached Moscow in September of the same year, Petrograd in October, Berlin in November, London in December, New York by the latter part of December and Chicago by early in January. Within a year it had visited nearly every part of the world.

The present pandemic, some say, began in Western Asia and others in Spain. During the summer it has been prevalent in the army camps of both the Allies and the Central Powers and has attacked from 30 to 40 per cent. of the people in Germany, Italy, France, England and Ireland. The disease was probably brought to this country by patients or carriers and landed on the Eastern Coast in August. In some camps it is reported to have attacked as high as 40 per cent. of the men.

Darling says that neither season nor weather seems to have anything to do with the disease. Infection occurs through the respiratory organs. The disease is not transmissable for great distances through the air. Isolation and quarantine are not practicable in army camps. The prevention of crowds by the closing of schools, churches and theaters and all places of public gatherings where the danger from droplet infection is greatly increased is a practical measure which tends to lessen the number of persons subject to infection. Darling recommends the wearing of gauze masks by nurses and others around patients; he thinks that there is considerable reason for doubting the etiologic relation of the influenza bacillus to the disease.

[I think the experiences of this epidemic have demonstrated that closing the schools, theaters, churches and other places of public assemblage at least so far as the cities are concerned have not proved of value as means of controlling the disease. As to closing of schools the disease tends to spare school children. The number of deaths of persons under 20 is small. In the second place, school inspection is an effective method of discovering the location of the disease. As to other assemblages theoretically they should be suppressed but in a city in which the infection is widespread there aer so many points of uncontrollable contact that no good is accomplished by suppressing the relatively few which are controllable. In the rural districts a contrary opinion might be valid.—Ed.]

Preparation of Influenza Vaccine. T. D. Leary[1] gives the technique for the preparation of the Leary vaccine widely used in this epidemic. The medium is a 1.5 per cent. agar prepared from meat infusion without glucose and made 1 per cent. acid to phenolphalein. From 3 to 5 drops of human blood are added to each tube. If the blood is added to the tubes when at 60°C. the agar is red and influenza bacilli while they do not grow well retain their virulence. If the blood is added at from 80° to 90°C. the agar is brown and influenza bacilli grows well on it but they lose virulence easily. Influenza bacilli are grown on this agar for from 15 to 18 hours at 37°C. The growths are then mixed with saline solution. The bacilli are killed by tricresol. The dosage is 400 million per half cubic centimeter. Control of sterility of killed bacteria is done by culture. No physiologic tests and no anaërobic tests are made, that is prior to issuing the vaccine. The prophylactic dose is 5 c.c., 1 c.c. and 1.5 c.c. given at 24-hour intervals. The therapeutic dose is 5 c.c. every 12 hours. The vaccine is injected into the muscles. Leary holds that the muscles themselves produce protective substances. Other articles appearing in this symposium[2] are: "The Use of Convalescent Human Serum in Influenza Pneumonia" by T. W. Meguire and W. R. Redden; "Centralized Health and Relief Agencies in an Influenza Epidemic" by E. R. Kelley and B. W. Carey; "The Open-Air Treatment of Influenza" by W. A. Brooks.

Origin of Present Pandemic of Influenza. The present pandemic of influenza was brought to this country by persons coming from European ports according to

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(1) Amer. Jour. Pub. Health, October, 1918.
(2) Ibid.

J. J. Keegan.[3] The first cases landed at Commonwealth Pier, Boston, Mass., August 28, 1918. Within two weeks more than 2,000 cases were reported in that Naval District. Several unusually definite observations fix the period of incubation at 48 hours. On the basis of the experiences during this first two weeks Keegan predicted that the epidemic would spread over the entire country and that it would attack between 30 and 40 per cent. of the entire population and that in each community the epidemic would run its course in from four to six weeks. This epidemic is pronounced to be more severe and the disease more contagious than was the epidemic of 1889 to 1893. It is caused by a specific virulent strain of the influenza bacillus against which individuals of the younger generations have relatively no immunity. In from 5 to 10 per cent. of the persons afflicted it develops into a massive and very fatal bronchopneumonia. This pneumonia according to Keegan is due to the influenza bacillus. This organism is recoverable from the lungs at autopsy in 82.6 per cent. of the cases and in 31.6 per cent. of them it is found in pure culture.

Efforts to produce the disease by inoculating a filtered sputum into the noses of volunteers not otherwise exposed to the disease proved negative. Keegan concludes, therefore, that the disease is not due to filterable virus.

The disease begins with a sudden onset without sore throat, bronchitis or any other prodromes. The symptoms are headache, general aching, general malaise and a temperature which may reach 106°F. Many persons have noted a duskiness of the skin. Leukopenia is present. The patients are generally mildly delirious. There is chilliness but no definite chill. Some of the cases develop edema of the lungs whereupon the case terminates fatally with great rapidity. Pneumonia is of the bronchopneumonia type though the consolidation is often massive. Pleural effusion is rare. Slight albuminuria is often found but a considerable degree of nephritis is rare.

Keegan says that the American epidemic is clearly

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(3) Jour. Amer. Med. Ass'n., Sept. 28, 1918.

a part of the pandemic which appeared early this year in Europe. The sputum to the naked eye is that of the streptococcus pneumonias of last winter. The predominating organism was a pleomorphic organism very similar to the organism described by Little (*Lancet,* 1918, 2.34). A pure culture of hemolytic streptococcus was found in 4 per cent. of the cases. The most common secondary invader is the pneumococcus.

Reports on Influenza. [Personal communication of Dr. E. C. Rosenow to the Illinois Influenza Commission consisting of Drs. A. A. O'Neill, chairman; C. S. Drake, state health commissioner, John Dill Robertson, health commissioner of Chicago, Col. H. I. Raymond, U. S. Army; Surgeon Owen Mink, U. S. Navy; Col. J. O. Cobb, U. S. Public Health Service and W. A. Evans, American Public Health Commissioner.

This statement is written down from memory and therefore is only reasonably accurate.]

"After I had seen a few cases of influenza I was struck by the uniformity of the sputum in its naked-eye characteristics. Soon I was able to diagnose influenza and, though with less certainty, the stage of the disease by the gross appearance of the sputum. Upon bacteriologic examination the sputum was found to contain influenza bacilli, four strains of pneumococci, at least two strains of streptococci and some staphylococci. I decided to make a vaccine from the organisms found in the sputum of cases severely sick with the disease. My vaccine is composed of a mixture of selected organisms, pneumococci and streptococci making up 75 per cent. of the whole and the other 25 per cent. being composed in the main of influenza bacilli though there are some staphylococci present. The bacteria are killed with tricresol. I give about two billion organisms as the first dose, about four billion as the third. The interval between injections is one week. At the time the report was made no person had taken all three injections. Many had taken two injections but most of the subjects had only taken one. No person who had taken one injection had developed the disease except a few who became sick within 48 hours after being injected. About 20,000 people had been injected at the time the report was made. In at least two institutions where the disease had obtained a foothold the epidemic had not spread."

Rosenow thought the only cultures that would protect against the disease in this epidemic were strains freshly located from cases sick during this epidemic.

On the strength of this report the Commission voted to proceed at once to the manufacture and use of this vaccine. In the meanwhile they would distribute and secure the use of at least 100,000 doses to be furnished them by Dr. E. C. Rosenow.

R. P. Forbes and H. A. Snyder[4] report that leukopenia is a constant factor in influenza. It is of diagnostic importance.

A. W. Hewlett and W. M. Alberty[5] report an epidemic of influenza at a navy base hospital in France. The first cases appeared July 16 and spread rapidly through the camp. After that it rather rapidly increased. The morbidity rate among the enlisted men was 37 per cent., among the hospital corps, 41 per cent. No cases occurred after August 2, except that six or seven individuals seemed to have a second attack several weeks after the first one.

Hewlett and Alberty hold the opinion that these six or seven persons had immunity lasting only a few weeks.

T. R. Little, C. J. Garofold and P. A. Williams[6] report that they were unable to find influenza bacilli in smears and cultures from the upper respiratory passages of patients suffering from the prevailing form of influenza.

An editorial in the *Journal of the American Medical Association,*[7] says that the "influence" in influenza is still veiled in mystery. It is true that the Pfeiffer bacillus is frequently found in influenza but it is also found in practically all cases of whooping cough and a large percentage of cases of measles and scarlet fever and in many cases of bronchitis and tuberculosis. There is just as good evidence that it is due to strains

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(4) Jour. Lab. and Clin. Med., September, 1918.
(5) Jour. Amer. Med. Ass'n., Sept. 28, 1918.
(6) Lancet, July 13, 1918.
(7) Oct. 5, 1918.

of streptococci or pneumococci or of several of these in association. The epidemic, however, never travels faster than human travel and this proves that it is the result of some human-borne organism.

Report of Dr. H. A. Bundesen to the Illinois Influenza Commission as the result of a visit to Boston. The Leary vaccine is made from a culture of influenza bacilli grown from sputum from patients sick with the disease. The bacteria are killed with heat. The approximate number of organisms in each c.c. is about 800 million. The initial dose is 0.5 c.c., the second dose of 1 c.c. is given the following day and on the third day a second dose of 1 c.c. is given. This makes three doses of a total of 1,200 millions given within forty-eight hours. The Rosenau vaccine is likewise a vaccine made from a pure culture of influenza bacilli from sputum obtained from cases occurring during this epidemic.

L. W. Maguire and W. R. Redden[8] agree with others who have written about this prevailing epidemic of influenza in stating that pneumonia is the cause of death in most cases. In the naval hospital at Chelsea, Massachusetts, they have treated more than 400 cases of influenza-pneumonia. In the earlier stages of the epidemic, as is the case in most epidemics, the death-rate was high. It reached 50 to 60 per cent. but latterly it has ranged around 30 per cent. In spite of this natural tendency of the disease to become milder the authors are of the opinion that the exceedingly low death-rate among 37 patients treated within the last two weeks prior to the date of the article warrants them in making a preliminary report in which they give their methods of treatment.

The treatment consists in the intravenous injection of serum from a patient convalescing from the disease. From 75 to 125 c.c. of serum are given intravenously. The interval between injections varies from 8 to 16 hours. The majority of the patients received a total of about 300 c.c. The serum was taken from patients within the first two weeks after return of the temperature to normal. The amount of blood drawn from each

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(8) Jour. Amer. Med. Ass'n., Oct. 19, 1918.

patient was 800 c.c.—half one day and half on the succeeding day. In most instances the serum was injected on the same day that it was drawn.

About one-seventh of the serums tested clinically were found to be impotent. In the case of serum that had to be kept over 24 hours three-tenths of 1 per cent. tricresol as a preservative was employed.

Thirty-seven of the patients were treated in this way. At the time the report was made thirty of the patients were convalescent, one had died and six were under treatment. Of the six, two were much improved, two had only received one treatment and two had not improved. Of the six, three received treatment first on the second day of the pneumonia, two on the third and two on the fourth. Of the thirty convalescents, eight received treatment on the second day, fifteen on the third, four on the fourth and three on the sixth. The patient who died received treatment on the fifth day.

[The treatment of an acute infectious disease by the intramuscular or intravenous injection of blood serum from a person who has recently had the disease and given satisfactory results in measles, mumps, scarlet fever and infantile paralysis.—Ed.]

Influenza in Chicago in 1918. J. D. Robertson and G. Koehler[9] made a preliminary report on the epidemic of influenza in Chicago on November 1 before the disease had fully subsided.

Influenza appeared at Great Lakes Naval Training Station September 9. In this station and also in a nearby army camp, Camp Grant, the disease was very severe and the mortality rate was high. In these military camps and in two nearby civilian populations—Highland Park and Rockford—the disease was violently explosive, rapidly running through the community and dying out quickly.

The disease appeared in Chicago somewhere about the middle of September. It manifested itself in the death-rate on September 22. On October 17, the apex as indicated by the number of deaths from all causes was reached. The rate of decline from the high point

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(9) Amer. Jour. Pub. Health, November, 1918.

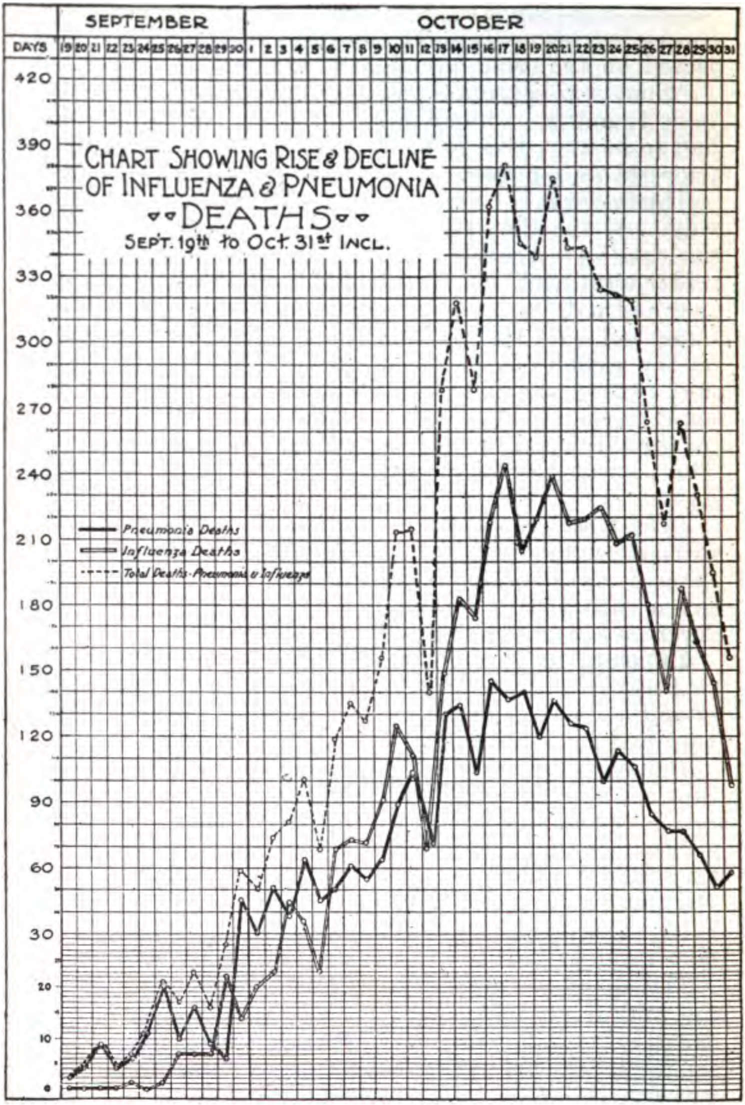

Fig. 9—Chicago Chart.

was about as great as the rate of climb to it had been. The epidemic bore most heavily on people of age period from 20 to 40, with age period under 10 ranking second. The authors are suspicious that the high pneumonia rate of 1917 was in some way related to the epidemic. They give a chronologic summary of the steps taken to control the epidemic and to care for the sick with physicians and nurses and to get the dead buried. Schools were not closed. On October 22, the distribution of Rosenow vaccine was begun.

Influenza in Chicago in 1890. W. A. Evans and M.

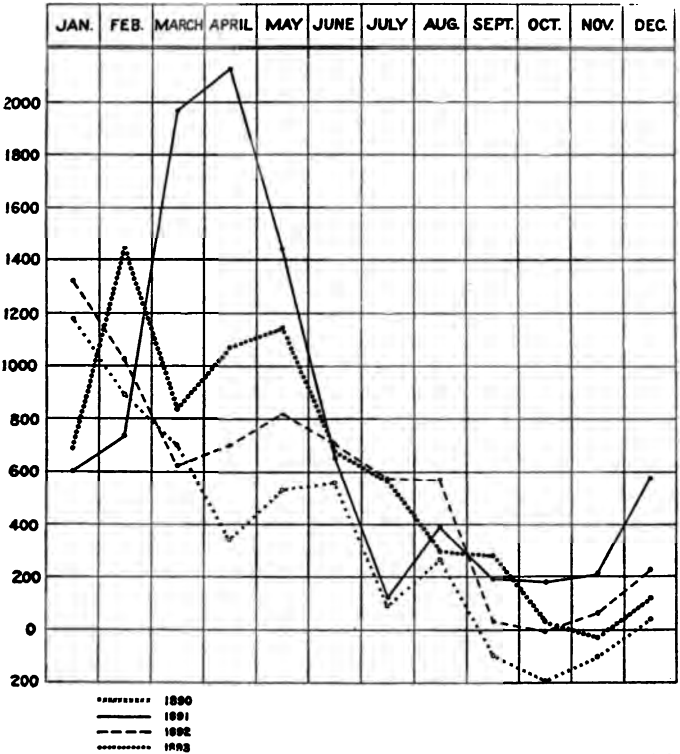

Fig. 10—Deaths from all causes by months as compared with expected deaths on basis of deaths in 1889 plus 5.2 per cent. each year for increase in population. The zero line represents expected deaths. The lines above the zero line indicate number of deaths above the expected. Those below zero line indicate number of deaths less than the expected.—Chicago.

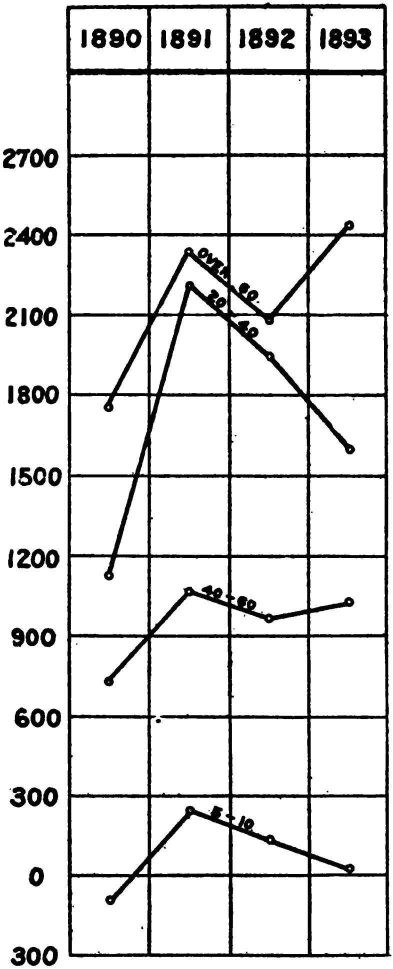

Fig. 11—Deaths for four years in certain age groups as compared with expected deaths on basis of deaths in 1889 plus 5.2 per cent. each year for increase in population. The zero line represents expected deaths. The horizontal lines above zero line indicate numbers of death above the expected. Those below zero line indicate numbers of deaths below the expected.—Chicago.

O. Heckard[1] in making a study of the great 1890 epidemic of influenza found that the disease began about January 1, 1890, and lasted four months. It recurred in March, 1891, and for two months thereafter was considerably worse than in the winter of 1890 In 1892 and 1893, the disease with pneumonia and bronchitis closely related and often dependent on it caused an exceptionally high death-rate especially in the first five months of each year.

A chart was prepared which showed the excessive number of deaths in the winter and spring months of these years as compared with the number of deaths expected on the basis of 1889 plus 5.2 per cent. each year for growth in population.

A chart (Fig. 10) shows that the heavy death-rates of 1890-93 inclusive were not the result of unusual mortality in the summer, autumn and early winter.

A second chart (Fig. 11) shows that the heaviest mortality fell on men and women from 20 to 40, that an unexpectedly heavy toll was taken from the age groups "over 60" but that children of from 5 to 10 were spared. This relative immunity suggests the query: Why close the schools during an epidemic of influenza?

Evans and Heckard warn us that we may expect a high death-rate from respiratory diseases for the next several years if the experience of 1890 is a criterion.

Douglas Symmers[2] finds great similarity between the lesions of the lungs in the present pandemic of influenza and those of pneumonic plague. The absence of buboes is not significant since buboes are not present in pneumonic plague. However, the possibility that the disease is pneumonic plague is removed by the bacteriologic findings, positive and negative, reported by many bacteriologists in this country and abroad.

E. E. Ecker[3] suggests that for culturing influenza bacilli sodium taurocholate in 0.5 per cent. strength be added to the culture media. This prevents the growth of pneumococci and other organisms and thus indirectly favors the growth of Pfeiffer bacilli.

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(1) Amer. Jour. Pub. Health, November, 1918.
(2) Jour. Amer. Med Ass'n., Nov. 2, 1918.
(3) Ibid.

Influenza in Boston in 1918. A. W. Hedrich, secretary of the American Public Health Association, prepared this chart showing the curve of the Boston epidemic of influenza. The first case of the disease occurred in the Naval Hospital, near Chelsea. Early in September the disease had reached Boston proper. On September 14, the death-rate began to be modified by it; 18 days later, October 2, the maximum of deaths was reached. The decline in its earlier phases was as short as the rise but the editor is informed that on November 5, the daily mortality rate was still nearly 50 per cent. above the normal.

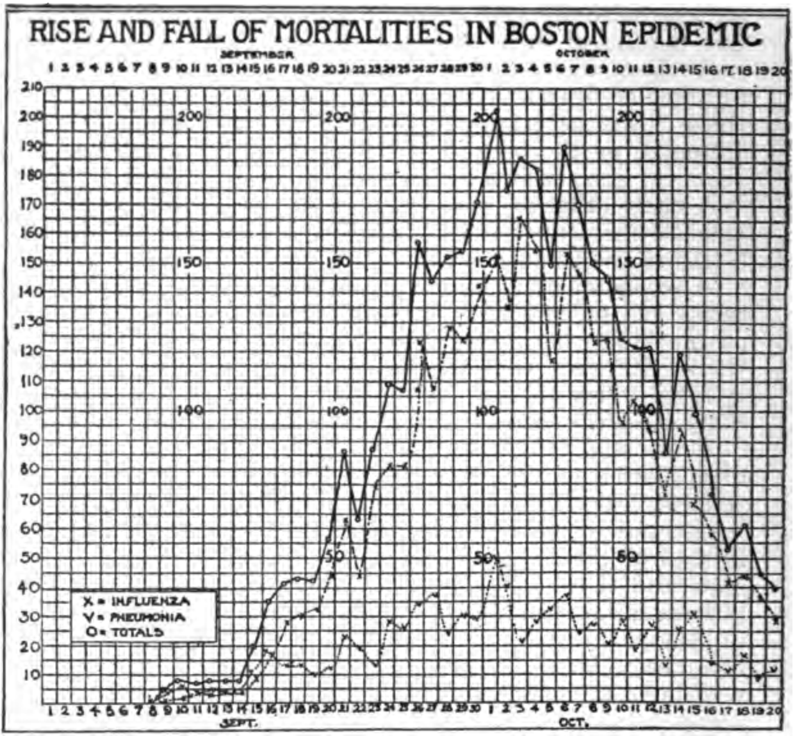

Fig. 12.

Cerebrospinal Meningitis. P. G. Wooley[9] says that the first stage of cerebrospinal meningitis gives the symptoms of generalized infection.

W. W. Herrick[1] reported that the diagnosis could be made in this stage in 50 per cent. of the cases and that the intravenous injection of large quantities of anti-meningococcus serum reduces the death rate, the duration of the disease and the complications because the disease is primarily a meningococcus septicemia. In a large percentage of the cases, according to Wooley, there is an associated upper respiratory tract disturbance in these early cases. Another early symptom of value is the petechial rash which appears about the shoulders and pelvic girdle. It appears in crops and in some cases the skin is dotted within an hour. Hemorrhagic and purpuric rashes sometimes occur. The rash may appear elsewhere on the trunk or on the mucosas. Headache is present in 85 per cent. of cases. Meningococci can be found in the blood-stream in 36 per cent. of the cases.

Dr. Charles Dopter[2] does not think there is any ground for the opinion that the meningococcus enters through Peyer's patches. The nasopharynx is the portal of entry. In his opinion the element of fatigue is the largest factor in determining infection. It is a disease especially of young soldiers. The incidence is much greater during the first year in the army than during any subsequent year. It is less among troops at rest than those in action. Lack of sleep is a contributing factor. There is apt to be an outbreak in a command when new troops join.

[The argument of Dopter does not convince. It seems more likely that the increase in meningitis which follows the introduction of new troops is the result of new carriers brought in or exposure of the new soldiers to carriers. A larger factor than fatigue is colds. The new soldiers not accustomed to the clothes, air temperatures, exposures, customs and habits, and crowded together maybe for the first time in their lives contract colds which permit meningococci to travel speedily from

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(9) Jour. Lab. and Clin. Med., June, 1918.
(1) Archiv. Int. Med., April, 1918.
(2) Ann. d'hyg. pub., March, 1918.

the surface of the mucus membrane of the nasopharynx to the meninges.—ED.]

Meningococci Carriers. P. Fildes and S. L. Baker[3] think that meningitis develops only in those rare individuals who are not able to limit the meningococci to the nasopharynx, assuming that they have secured entrance, but permit them to pass rapidly to the meninges. The rule is that meningococci do not go beyond the nasopharynx. Carriers do not develop into cases. Cases are not infectious before the onset of symptoms. Cases of cerebrospinal fever are not directly responsible for the spread of the disease. The cases infect carriers among the contacts. These in turn infect people who develop the disease.

A. G. L. Reade[4] says that 1.5 per cent. of the men entering naval barracks at Chatham are meningococcus carriers. Most of the cases of meningitis developed in men who had only been in the service a few days. The most important means of preventing the disease was to decrease crowding. It was found that the cubic feet of air space had been reduced to 230. The minimum is now 500 cubic feet. Ventilation was improved. Night inspectors watched out for this. Throats were examined for carriers.

Fletcher[5] proposes to use the nose spraying methods devised by Gordon, Hine and others for the control of meningococcus infections of the nose to prevent infection in schools with measles, scarlet fever and other forms of contagion. A soldier admitted in December to the ward of a general hospital developed measles and exposed 100 other patients, including nurses. All patients and nurses were required to use a nasal douche and gargle with permanganate in normal salt solution 1 to 4,000. One nurse failed to take this precaution. She developed measles on the fourteenth day. All others escaped. The method has succeeded in other hospitals.

A school was fitted up with a steam spraying plant after the Gordon Flack method. It sprays a 1.25 per cent. solution of zinc sulphate. The students are re-

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(3) Lancet, Oct. 20, 1917.
(4) Jour. Roy. Sanit. Instit., February, 1918.
(5) Brit. Med. Jour., March 16, 1918.

quired to douche and gargle with a permanganate solution. A nasal glass is used. The method has controlled contagion in this school.

Bassett, Smith, Lynch and Maugham[6] examined the nasal secretions of 26,543 non-contacts for meningococci at the Greenwich Naval depot in 1917. They found that 4.7 per cent. of the men were carriers. These men had not been recently in contact with cases of meningitis. Most of them were temporary carriers. The greatest number of carriers was found in May. This was probably because April had been cold and many men suffered from catarrhs. Most of the organisms belonged to Type II. and few to Type III.

P. G. Wooley[7] recommends the routine use of nasal spraying with dichloramine-T in camps for the prophylaxis of respiratory diseases as a result of the experiences of the troops in Camp Greene during the winter of 1917-18. There were 40,000 troops in that camp. There were but twenty-nine cases of cerebrospinal meningitis although from 5 to 7 per cent. of the troops were carriers. The troops that systematically used the spray had the least amount of meningitis. The organizations which systematically and regularly used the spray had no cases of meningitis. When a case developed in an organization and they at once began the use of the spray no other cases developed. The organizations using the spray had least measles, pneumonia and other forms of respiratory disease.

G. Mathers and R. D. Herrold[8] made an extensive survey of the men in a large military camp; 36 per cent. were found to be meningococcus carriers, but only 1.2 per cent. were chronic carriers. The biologic type of cocci found in the cases of meningitis in this camp was the same as that obtained from the carriers present in the camp. It differed from the type found responsible for sporadic cases of the disease in Chicago.

R. G. Canti[9] found meningococci in nasopharyngeal cultures from cases of meningitis; 28 per cent. of the cases were due to Type I. and 72 per cent. to Type II.

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(6) Lancet, Feb. 23, 1918.
(7) Jour. Lab. and Clin. Med., April, 1918.
(8) Jour. Infec. Dis., June, 1918.
(9) Jour. Hygiene, December, 1917.

Meningitis Anti-endotoxin. M. H. Gordon[1] contends that the curative powers of meningitis serum would be considerably enhanced if it contained a fair quantity of anti-endotoxin for the two common varieties of meningococci. He extracted endotoxin according to the method of Bestedka. With this he produced an anti-endotoxin. He furthermore devised a method of standardizing anti-endotoxin.

Throat Smears in the Diagnosis of Measles and Rubella. R. Tunnicliff[2] finds throat smears of service in differentiating mild scarlet fever from rubella. In throat smears from measles, a small round diplococci is the predominating organism. This diplococcus is found in the secretions from the throat, nose and eyes of measles patients during the onset of the disease. As the throat symptoms abate the organisms lessen. Tunnicliff thinks this is the measles organism. Smears from the throats of rubella patients show the predominating organism to be a larger elongated diplococcus. These diplococci are sometimes in chains. They show a capsule sometimes. There are a few leukocytes in the smears. In smears from the throat in scarlet fever there is a larger coccus usually in pairs, sometimes in chains of four and with a wide capsule.

Measles Organism. R. Tunnicliff[3] found that the blood of measles patients constantly contained a diplococcus during the pre-eruptive and eruptive stages of the disease. The coccus was also present in the eye and nose secretions.

Bacteriology of Measles. An attempt to value the multiple and varied bacteriologic findings in measles has been made by L. Hektoen.[4] The organisms offering the most promising fields for study are the influenza bacillus, certain diphtheroid bacilli, hemolytic streptococci and the Tunnicliff diplococcus. Davis found influenza bacilli in pure culture were isolated in thirteen of twenty-two cases.

Recent observations indicate that bronchopneumonia and other complications of measles occur as the result of

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(1) Brit. Med. Jour., Jan. 21, 1918.
(2) Jour. Amer. Med. Ass'n., July 13, 1918.
(3) Jour. Inf. Dis., May, 1918.
(4) Jour. Amer. Med. Ass'n., Oct. 12, 1918.

infection with hemolytic streptococci. To prevent such infection, measles patients should be isolated from all other persons regardless of the diseases from which such persons suffer or whether any disease is present or not. There is a good deal to make one think that the Tunnicliff diplococcus is the true cause of measles. The conclusion arrived at by Hektoen is that the question is still undecided.

Organism in Scarlet Fever. R. W. Pryer and J. B. Kelly[5] describe two organisms, one a diphtheroid and one a large polymorphic organism grown from the blood in cases of scarlet fever.

Test for Scarlet Fever. R. W. Pryer and G. Sewell[6] report on a skin test which indicates immunity to scarlet fever. This test was made with scarlatin, a preparation made by growing the large plimorphic organism elsewhere described. Scarlatin was injected intradermically much after the method of the Schick test.

Blood Serum of Convalescent in Scarlet Fever. G. H. Weaver[7] is fairly certain that the progress of scarlet fever can be favorably influenced by the injection of about 60 c.c. of blood serum from convalescents from scarlet fever. In a few instances a second dose was given. The blood for serum is drawn on the twentieth to twenty-eighth day of the disease. Only the blood from patients proven by a Wassermann examination not to have syphilis is used. The blood must be sterile.

Diphtheria Carriers. Lewis[8] thinks that a complete control of carriers would make diphtheria so rare that the ordinary physician would never see a case. Among the factors responsible for carriers are nose deformities. Any form of nasal obstruction is a factor. He says that Italians and Jews will not keep their noses clean and therefore they are frequently carriers. Negroes, on the contrary, usually keep their noses clean and are, in consequence, rarely carriers. During a period of sunshine few carriers are found. In gloomy weather many are located. Carelessness is a factor.

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(5) Jour. Lab. and Clin. Med., February, 1918.
(6) Ibid, June, 1918.
(7) Jour. Med. Research, March, 1918.
(8) Interstate Med. Jour., January, 1918.

Diphtheria in the Army. According to F. R. Keefer, S. A. Friedberg and J. D. Aronson,[9] diphtheria may be a disease of some importance in a military camp. At Camp Doniphan, diphtheria became troublesome in October, 1917, and it was not until January, 1918, that the disease came under control. During this period 461 cases and 686 carriers were discovered. Only three persons died and these died from myocardial degeneration rather than as a direct result of diphtheria. However, in order to control the epidemic it was necessary to withdraw 1,000 soldiers from their ordinary duties, to make 30,000 cultures and to do a lot of work.

Among the conclusions drawn from this study are these:

1. A single negative culture is only of relative value as is shown by the fact that pre-operative cultures taken from tonsils that later proved positive for diphtheria were negative in 22.8 per cent. of the cases.
2. In routine cultures from carrier's nose cultures were positive in 26 per cent. of cases.
3. Wherever an individual is found to be a chronic carrier the organisms should be tested for virulence.
4. Some underlying pathologic condition is responsible for the chronic carrier state.
5. In the great majority of cases the carriers harbor the bacilli in the tonsils, a few carry the germ in the nose, only a small group maintain the infection in both nose and tonsils.
6. The results of local treatment of the tonsils of carriers is problematical since the organisms are situated deeply in the tonsils.
7. In persistent carriers with tonsillar infection enucleation offers the only certain procedure for terminating the carrier state.
8. The most persistent nasal carriers are those with inflammatory or atrophic local conditions.
9. Improperly constructed and improperly worn masks give a sense of false security.
10. The Schick test with vaccination of susceptibles by the toxin anti-toxin method should be done on all persons brought intimately in contact with patients.

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(9) Jour. Amer. Med. Ass'n., Oct. 12, 1918.

11. Toxin for the Schick test should be prepared fresh. No diluted toxin more than twenty-four hours old should be used. Undiluted toxin should be kept in a dark place in the refrigerator.

12. Diphtheria patients should be released from quarantine after their negative cultures at three-day intervals. Chronic carriers should not be discharged until cultures taken over a long period of time prove consistently negative.

The Organism of Infantile Paralysis. G. D. Heist, M. Solis-Cohen and J. A. Kolmer[1] were able to find four strains of the minute anaërobic microörganisms described by Flexner and Noguchi in the nervous tissue of monkeys and human beings dying of acute poliomyelitis. The organism was grown in kidney ascitic fluid. Cultures of this organism differed so little in appearance from non-inoculated tubes that the authors say that inspection of the tube is of no value in determining whether there is a growth or not. The best method is examination of a hanging drop of the culture. To stain the organism the culture media must first be washed off. Rigid anaërobic conditions must prevail. It is best to use rabbit kidney that has been somewhat aged.

E. C. Rosenow and G. W. Wheeler[2] contend that a pleomorphic coccus is the probable cause of infantile paralysis. This coccus has been found in large numbers in adenoids and tonsils and in smaller numbers in the lesions in the nervous system and in the mescutive glands. In aërobic cultures it closely resembles the green producing streptococci or pneumococci of low virulence. When grown anaërobically it resembles the globoid body of Flexner and Noguchi.

The organism grows into cocci of all sizes from a large coccus to an ultramicroscopic organism. It can not be considered as an accidental contamination. This organism is found in diseased tissues and not generally elsewhere. It can be cultured and the disease can be produced with the culture and the organism can be recovered in turn from the experimentally produced lesions. The serum reactions of the organism are specific. It can

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(1) Jour. Inf. Dis., February, 1918.
(2) Jour. Inf. Dis., April, 1918.

be rendered filtrable. The serum made with it is preventive and curative. The organism of Flexner and Noguchi they claim is the anaërobic and non-antigenic form of the streptococcus.

E. C. Rosenow, E. B. Towne and C. L. V. Hess[1] say that the Rosenow poliomyelitis streptococcus tends to localize electively in the nervous systems of young guinea pigs, rabbits, puppies and kittens and less often in adults of the same species and in adult monkeys. The symptoms and lesions are those of poliomyelitis.

E. C. Rosenow and A. Gray[2] say that by means of agglutination experiments it has been possible to differentiate the poliomyelitis streptococcus from the green-producing streptococci. The same method strongly indicates that this pleomorphic streptococcus in some way bears etiologic relation to epidemic poliomyelitis.

E. C. Rosenow[3] reports the results of the rather wide use of poliomyelitis horse serum in an epidemic of infantile paralysis occurring in Davenport, Iowa, in the summer and autumn of 1917. The horse serum was made by injecting the pleomorphic Rosenow coccus into horses after a method previously described. Fifty-eight patients were treated; ten died, but only three of these were treated before the last stages of the disease—a mortality of seventeen in the first instance and of six in the second. In twenty-three untreated cases there was a mortality of 35 per cent. If the moribund cases be added to the untreated cases a rate of 53 per cent. is given. Paralysis did not develop in a single case in which treatment was given before the onset of paralysis. In only 8 per cent. of patients receiving treatment will there be permanent impairment of function. The serum was given intravenously. Rosenow contends that the results given here were better than those recorded when other treatments have been used. He does not advocate intraspinal injections. Such injections irritate and do harm and, in addition, the organisms are located too deep in the nerve tissue to be reached by them.

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(1) Jour. Inf. Dis., April, 1918.
(2) Ibid.
(3) Ibid.

J. W. Nuzum and R. G. Willy[4] report that they have been able to confirm their findings of a coccus in human poliomyelitis. In 159 cases treated by antipoliomyelitic horse serum the results were excellent.[5] They now report that a highly potent horse serum can be produced by repeated intravenous injections of aërobic cultures of the poliomyelitic coccus. This serum will make monkeys immune. It also has curative powers for the disease in monkeys.

L. Hektoen, G. Mathers and L. Jackson[5] found cocci similar to those grown from cases of infantile paralysis in stained sections of the central nervous system from fifty patients with infantile paralysis dying in different parts of the United States. They do not believe that the presence of this coccus is explainable as due to accident or contamination.

H. L. Amoss[6] does not think that the globoid bodies and the streptococci found associated in poliomyelitis are in any way related. A monkey immunized to streptococci produced a serum which agglutinated the streptococci but was without effect on the filtered virus. The active virus survives in the brain of rabbits for four days, but not for seven.

W. G. Smillie[7] is of the opinion that the globoid bodies are not related to streptococci. In his opinion the almost constant presence of poliomyelitis is the result of agonal invasion.

H. L. Amoss and F. Eberson[8] do not think that Rosenow's antipoliomyelitic serum has curative power. They say "its acts in the manner of normal horse serum; it promotes the passage of the veins of poliomyelitis from the blood into the nerve organs and it does not protect from infection."

We have so nearly come to an *impasse* in the study of bacteriology and epidemiology of infantile paralysis that we are ready to consider speculative discussions of the subject. Especially is this true when the speculations are based upon a lot of laboratory experimental

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(4) Jour. Med. Research, March, 1918.
(5) Jour. Amer. Med. Ass'n., Oct. 13, 1917.
(5) Jour. Med. Research, January, 1918.
(6) Jour. Exp. Med., March, 1918.
(7) Ibid.
(8) Ibid, February, 1918.

and clinical work on the disease. L. D. Bristol[9] suggests that infantile paralysis may be nothing more than the manifestation of a common widespread human pasteurellosis—the non-paralytic—a better term than abortive—cases representing chiefly the digestive and respiratory types of the disease while the paralytic cases may be included in the nervous type. The bipolar bacillus may be closely akin to that causing distemper in dogs and other paralytic diseases in other lower animals. Local outbreaks of the disease have their reservoir in lower animal reservoirs. A strain having become infective to humans is liable to become more virulent to humans as it passes through a sequence of human hosts.[1]

Effect of War on Consumption. H. Kerr[2] says that war increases the death-rate from consumption. If a country is occupied by the enemy the increase is very great. If not so occupied it is less. Great Britain has suffered less than any of the European countries, but it has suffered nevertheless. The factors responsible for the increase in Great Britain, but especially noted in the case of Newcastle, where Dr. Kerr's studies were made, were stated in the order of their importance: (1) poverty, actual or relative to a rising cost of living or scarcity of food; (2) bad or insufficient housing; (3) overstrain physical or mental; (4) employment under unhealthy conditions; (5) constitutional enfeeblement; (6) increased opportunity for direct infection from milk; (7) lowering the powers of resistance by over-indulgence in alcohol; (8) lack of proper medical attention. There is less drunkenness now in Newcastle than there was before the war. The war has caused more attention to be paid health. In consequence, tuberculosis is reported earlier. The number of deaths of unnotified cases of tuberculosis in 1916 was less than half that in 1913 and the average span of life after notification increased from 6½ to 12½ months.

Tuberculosis in France. C. N. Dercle[3] refutes the statements and conclusions made by Biggs in his report on tuberculosis in France. He says that when the war

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(9) Jour. Med. Research, January, 1918.
(1) Also Practical Medicine Series, 1918, Vol. I, p. 120.
(2) Med. Officer, Oct. 27, 1917.
(3) Med. Record, Jan. 5, 1918.

started the French soldiers entered the army without full examination. Later, those thought to be suffering from tuberculosis were sent home. Landouzy reported that 86,000 had been so returned. Using this number as a factor the number of cases of consumption in France was computed. Dercle says that these men were sent home by surgeons inexperienced in consumption and that later and completer examinations showed that less than 20 per cent. of them had consumption. The chief danger to the French people from tuberculosis now lies in the large number of consumptives found among the prisoners returned to France from German prisons.

Tuberculosis in Soldiers. G. E. Bushnell[4] thinks that our practice in times of peace has been in error in giving too great weight to slight indications of structural change in the lungs as indicative of tuberculosis or demanding a life in a sanitarium. In examining in the Army for tuberculosis they try first of all to exclude cases of active tuberculosis, but they give equal thought to holding men in the service who have only uncertain or slight indications of the disease. We have an exaggerated idea of the likelihood of men becoming actively tuberculous as the result of life in the army or even fasting and hardships. "There is too much of a tendency to coddle them, to keep them filled with chocolates and to stuff their pipes with unending amounts of tobacco, to amuse them at all costs."

Virulence of Tubercle Bacilli in Sputum. Corper[5] directed his attention to determining the virulence of tubercle bacilli obtained from sputum, to answering the question: Are all the tubercle bacilli found in the sputum virulent? The investigations revealed that in the majority of open cases of pulmonary tuberculosis the tubercle bacilli were virulent enough to produce systemic tuberculosis in guinea-pigs in doses of a millionth of a milligram, that the range of virulence was very small, lying between 10 and 120 bacilli. Basing their next conclusion on the researches of Webb, Gilbert and Gregg[6] they say that in 97 per cent. of cases the bacilli in

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(4) Med. Record, Jan. 5, 1918.

(5) Jour. Amer. Med. Ass'n., May 4, 1918.

(6) Med. Record, 1915, 208 and Jour. Amer. Med. Ass'n., Sept. 26, 1914.

sputum are capable of infecting a child in a dose of one-millionth of a milligram. Drying and sunlight very rapidly destroys the virulence of tubercle bacilli.

Infectious Leprosy. G. W. McCoy[6] says it is not enough to make a diagnosis of leprosy, but it is also necessary to determine whether or not the disease in infectious. He quotes Thompson as holding that nerve leprosy is not contagious; Delio as stating that maculo-anesthetic leprosy is not contagious; Blaschko that anesthetic leprosy is comparatively harmless to its surroundings; and Sandwith that the only dangerous leprosy is that in which the bacilli are discharged from the nose, pharynx or from ulcers. The *Weekly Bulletin* of the Department of Health of the City of New York says when the leper has no open lesions and no discharge from the nose it is safe for him to be at large. McCoy cautions against accepting all acid-fast bacilli in the nose secretions as lepra bacilli. Acid-fast bacilli in nodular lesions are almost certainly lepra bacilli.

The author's technique for taking a specimen is as follows: After cleansing the nodule or other area from which it is desired to secure a specimen, the area is seized between the thumb and finger and squeezed until it is bloodless; maintaining the pressure the operator makes an incision with the blade of a safety razor. The edge of the razor blade is inserted in the wound and the edges are scraped. The serum is transferred to a slide fixed and stained in the usual way. If a patient gives both a Wassermann and a tuberculin test and has clinical evidence of leprosy the diagnosis may be considered to be established. Diagnosis of leprosy on the strength of the histology should not be made unless acid-fast bacilli are demonstrated.

Military Importance of Venereal Diseases. W. C. Gorgas[7] in an address before the American Public Health Association says: In the course of the year we should be able to keep more men in the trenches and have a more efficient force by having eradicated venereal diseases than by eradicating wounds. He opines that the commanding general of an army would agree with this opin-

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(6) New Orleans Med. and Surg. Jour., October, 1917.
(7) Social Hygiene, January, 1918.

ion. Personally, he is inclined to think education more effective than individual prophylaxis in controlling venereal diseases.

R. C. Holcomb,[8] as the result of statistical inquiry among sailors in the U. S. Navy, concludes that medical prophylaxis has not given the results that were expected of it and its value diminishes rapidly with the length of time between exposure and treatment. Station prophylaxis should be given so long as there is any chance that it will reduce the incidence of venereal disease. Prophylaxis may give a false sense of security. Men with venereal disease should be quarantined during the acute stage of their disease. When a man with a venereal disease is transferred, a transcript of his venereal history should accompany him. Holcomb can not say whether stoppage of pay affects the incidence of venereal disease in the Navy or not. He favors all kinds of educational and moral prophylaxis. He thinks all-night leaves for minors should not be allowed.

W. A. Sawyer[9] gives the following outline of a plan for the control of venereal diseases, the administration of which has been begun in California:

1. Reporting of cases.
2. Isolation of those found to be spreading the disease.
3. Hospitalization when necessary.
4. Examination of prisoners for evidence of venereal disease.
5. To prevent infected prostitutes from moving from one town to another.
6. Opportunities for prostitutes to enter other and harmless occupations.
7. Investigation and standardization of venereal disease hospitals, dispensaries and clinics.
8. To furnish arsenophamine to hospitals, dispensaries and clinics.
9. To provide opportunities for free diagnostic laboratory tests of venereal disease.
10. To provide leaflets and other educational matter

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(8) Social Hygiene, January, 1918.
(9) Ibid.

on venereal diseases, continence and related subjects.

11. To suppress prostitution.

12. To prevent the licensing of prostitutes and houses of prostitution by local government either directly or indirectly.

Venereal Disease in the Army. W. F. Snow and W. A. Sawyer[10] report the progress made in the con-

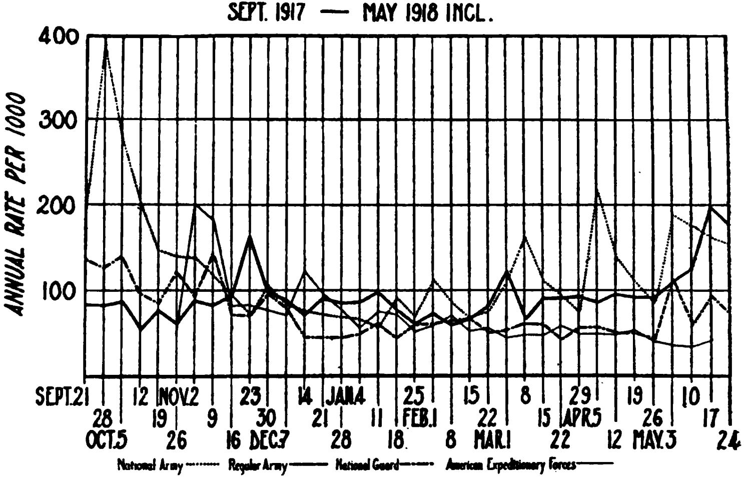

Fig. 13—Annual venereal disease rates per thousand men in the National Army, Regular Army, National Guard and Expeditionary Forces by weeks for the period from Sept. 21, 1917, to May 24, 1918, inclusive.

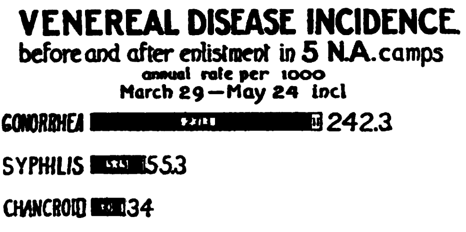

Fig. 14—Annual rates per thousand men, before and after enlistment, in five National Army Camps: Dix Lee, Upton, Meade and Pike, based on 37 special weekly reports.

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(10) Amer. Jour. Pub. Health, September, 1918.

trol of venereal diseases in the Army as shown in the accompanying diagrams (Figs. 13-15). They say that state boards of health are putting the control of venereal diseases on a sound public health basis. In thirty-four states and one territory venereal disease must be reported. In twenty-three states and one territory these diseases are required to be quarantined. Quarantine has proved practical. Sawyer thinks this program will reduce venereal disease by half in a few years.

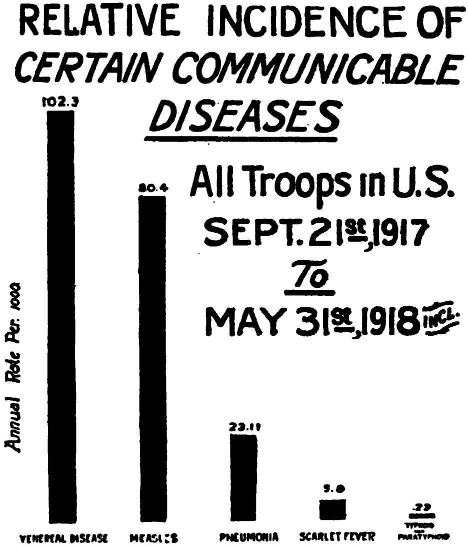

Fig. 15—Comparison of the annual rates per thousand men for all troops in the United States between Sept. 21, 1917, and May 31, 1918, of certain of the more important communicable diseases.

Acute Infectious Jaundice. M. H. Neill[1] says that several epidemics of acute infectious jaundice in the United States have been very well established. In the War of 1812, an outbreak of the disease occurred among our troops. Likewise there were epidemics among the troops in the Civil War. It seems probable that there

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(1) U. S. Pub. Health Rep., May 10, 1918.

have been 19 epidemics since the first one reported by Pittman from Rocky Mount, N. C., in 1849.

Acute infectious jaundice is due to infection with the *Spirochaeta icterohemorrhagicae.* This spirochete has been found to be very prevalent among wild rats in New York City, Nashville, Tenn., and Washington, D. C. It is found in the blood and urine of persons suffering from acute infectious jaundice. It can be found by: (1) examination of the blood films; (2) examination of the blood by dark-field illumination; (3) by injection of blood into the peritoneum of the guinea-pig—in this location typical lesions are produced; (4) by examination of the urine by the dark-field method or by injection of urine into the peritoneum of a guinea-pig.

J. W. Jobling and A. A. Eggstein[2] saw a case of infectious jaundice in Nashville, Tenn. This caused them to examine the blood of more than 100 wild rats for *Spirochaeta icterohemorrhagiae.* They found the organism present in 10 per cent. of the animals examined.

H. Noguchi[3] found about the same incidence of carriers among wild rats caught in New York City.

H. Noguchi[4] holds that the proper name for this organism is *Leptospira icterohemorrhagiae.* The organism grows luxuriantly in Ringer's solution to which more than 10 per cent. normal rabbit serum has been added. It grows best at from 30 to 37° C. It is an obligatory aërobe. The organism does not survive in urine longer than twenty-four hours unless the urine has been slightly alkalinized. Under normal conditions the organism cast off in the feces does not survive for twenty-four hours. The organism will not keep alive in polluted water, sewage or soil for more than three days at most. Most of the aërobic bacteria in feces, soil, sewage and tap water inhibit the growth of the organism. *Bacillus typhosus, B. dysenteriae* and the pneumococcus all inhibit the growth of the organism. It is easily destroyed by bile, but it resists the action of saporin. Neither culex, the larvae of the housefly, blue bottle fly or wood ticks or leeches act as intermediary hosts.

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(2) Jour. Amer. Med. Ass'n., Nov. 24, 1917.
(3) Jour. Exp. Med., 1917, p. 755.
(4) Ibid, May, 1918.

Plague. Dr. Arthur Stanley[5] reports that as a result of his prolonged and extensive experience as chief of the municipal health department at Shanghai, he is of the opinion that the proper method of controlling plague is by rat-proof building and careful collection of household refuse. Of these the first is much the more important.

Relapsing Fever. J. J. Waring[6] thinks that a focus of relapsing fever exists at Bear Creek Canon in Colorado. In 1915 Meader[7] reported a group of cases of this disease and suggested that the infection was left there by a band of gypsies. Waring's patient was infected in the same locality, indicating that certain insects are infective there. The probability is that the vector is the body louse, though there is a possibility that the intermediary host is *symphoromyia,* a variety of biting fly found in that vicinity.

Trench Fever. Bruce, Davis and others,[8] acting as a commission on trench fever, found that when the excreta from lice are scratched into the skin trench fever results. Lice will leave a man with fever for one who is free from fever, thus explaining the spread of the disease.

R. P. Strong and others forming a trench fever commission[9] report that trench fever is not typhoid, but is a specific fever. The organism which causes it is present in the blood plasma. It appears not to be filterable. The disease is transmitted by the bite of the body louse. The commission produced the disease experimentally in four men by subjecting them to the bite of lice that had been fed on trench fever patients.

Rocky Mountain Spotted Fever. In 1916 Wolbach reported finding an organism which seemed to be the cause of Rocky Mountain Spotted Fever. He reports[1] that the specific lesions of the disease are practically limited to the blood-vessels of the skin and genitalia. There is a characteristic angeitis of these vessels. The specific organism is a minute parasite that in unclassifiable. It is

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(5) Med. Officer, April 13, 1918.
(6) Amer. Jour. Med. Sci., June, 1918.
(7) Colorado Med., 1915, XII. 365.
(8) Brit. Med. Jour., March 23, 1918.
(9) Jour. Amer. Med. Ass'n., June 1, 1918.
(1) Jour. Med. Research, January, 1918.

a minute lanceolate rod occurring in pairs surrounded by a halo, staining with difficulty and occurring in the large mononuclear endothelial cells. This small organism is just large enough to be seen with a microscope. He now reports finding this organism in the tissues of man. The disease induced in animals exactly duplicates that in man. The same organism is found in infecting ticks.

Qualities of Vaccine. It is the opinion of H. Noguchi[2] that vaccine mixed with 40 per cent. glycerine deteriorates rather rapidly within six months at 4° C. and within two months at higher temperatures. Vaccine virus can be propagated in the testicles of rabbits. Virus thus obtained is best kept in Ringer's solution or 0.9 per cent. salt solution. It keeps well in 0.5 to 1 per cent. solution of phenol. This is much superior to glycerol. To preserve vaccine it should be kept in a sealed tube. It does not stand drying or high temperatures.

J. W. S. McCollough[3] warns physicians of Ontario that vaccination will not take if the vaccine used has been kept in the doctor's bag, in an office drawer or on top of his desk, exposed to light or in overheated rooms. No vaccine will stand such treatment and continue effective.

J. N. Force[4] observed that in a certain series of vaccinations there had been 20 per cent. failures, although the vaccine used had been shipped directly from the producing establishment. The vaccine had not been iced in transit but it was so young and the percentage of failures was so high that Force thought the trouble must have been in the process of manufacture of the virus.

Vaccine virus is mixed with a 50 per cent. neutral aqueous solution of glycerine and ground. U. S. P. glycerine must be neutral. But by reason of war conditions much glycerine on the market is alkaline. Vaccine made with such glycerine rapidly loses its potency.

The responsibility for successful vaccination is divided. The producer should use proper vaccine material. A vaccine strain tends to run out and must, therefore, be periodically re-inforced. That a certain manufacturer had a potent product in 1908 does not argue

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(2) Jour. Exp. Med., March, 1918.
(3) Pub. Health Jour., January, 1918.
(4) Bul. Calif. State Board of Health, May, 1918.

that his product is potent in 1918. The vaccine material must be properly handled and suspended in neutral glycerine solution. The retail dealer should buy only from the manufacturer. He should keep his vaccines on ice the year round. Vaccine kept on ice will keep its potency for six months. Not kept on ice it rapidly deteriorates in potency. The vaccinator should keep the vaccine cool while it is in his possession. Vaccine rapidly loses potency when carried in the pocket. He should use only a modern technique. He should be familiar with the three manifestations of successful vaccination; primary vaccinia, secondary vaccinia and immediate reaction. He should insist on a vaccine which gives 100 per cent. of vesicles in those not previously vaccinated. He should never give a certificate that he can not successfully vaccinate any person. If a person not previously vaccinated does not give one of the reactions either the physician or his vaccine is at fault.

E. D. Kremers[5] holds that vaccination by incision is the only vaccination method which should be used in military practice. It is the method of choice. The cross scarification method produced 92.4 per cent. takes as compared with 87.1 per cent. for the incision method. This is more than offset by the higher percentage of infections after the cross scarification method.

[Dr. Kremers does not record any experience with the method of vaccination devised by Kinyoun and advocated by Mill and used by a portion of the Canadian forces.—Ed.]

Anthrax. F. C. H. Coutts[6] reports that during the last three years thirty-six cases of anthrax have occurred which were reasonably certainly due to the use of shaving brushes. The hair used in making these brushes had never been disinfected. It was invoiced as goat hair, but it was probably Chinese horse hair.

The Danger from Anthrax in Shaving Brushes. This danger is again emphasized—this time by J. B. Ludy and E. C. Ruce.[7] These gentlemen report three cases of anthrax of the face and neck two of which were due

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(5) Military Surg., May, 1918.
(6) Abst. Jour. Roy. Sanit. Inst., October, 1917.
(7) Jour. Amer. Med. Ass'n., Oct. 5, 1918.

to infection by shaving brushes. Two of the patients were saved apparently by the prompt use of anthrax serum. When the third was taken sick no serum was available and the patient died. The typical lesion is a crater-like ulcer with a black necrotic bottom.

Anthrax bacilli were recovered from the ulcers but not from the brushes. The wounds were minor abrasions made in shaving and the history was that a new shaving brush had been employed.

The Public Health Service has issued an order that shaving brushes shall be stamped with the name and address of the manufacturer. No brushes are to be made from bristles that have not been sterilized. Sterilization is done by steam under pressure. A bulletin of the North Carolina Board of Health says that shaving brushes can be sterilized by leaving them in 40 per cent. formaldehyde for 40 minutes.

Hosts for Round Worms. E. H. Stewart[8] proves that ascaris lumbricoides can have white rats as an intermediate host. He had poor success in direct inoculation of hogs, dogs and cats with ascaris. When he attempted to inoculate rats success was immediate. In white rats ascarids larvae produce pneumonia and other lung diseases. The observations of Stewart confirm the opinion of Leukart.

Cause of Cancer. G. Luden[9] continues his series of experiments attempting to lay a foundation for carcinoma. Diets which increase blood cholesterol decrease the lymphoid defense and predispose to cancer. Perhaps diets which decrease blood cholesterol and thus increase lymphocyte defense may help in the cure of cancer.

Hay Fever. According to Dr. W. Scheppegrell,[10] 1 per cent. of the population of the United States is subject to hay fever; 90 per cent. of the fall cases of hay fever in the eastern and southern states are due to the common and giant ragweeds, the remainder being due to the cockle bur, marsh elder and a few other weeds. In the Pacific and Rocky Mountain region the above weeds

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(8) China Med. Jour., March, 1917.
(9) Jour. Lab. and Clin. Med., December, 1917.
(10) Amer. Jour. Pub. Health, June, 1918.

are replaced by the worm weeds, sage and a few others. Golden rod, roses and rosin weed are not factors. Spring hay fever is due principally to the grasses—amaranths, chenopods, Russian thistle and yellow dock. The spring pollens are borne only short distances, rarely so far as a mile. The autumn pollens will traverse a distance of five miles. Weed laws should specify that if a man does not cut the weeds on his land the city may do so and assess the cost against the land. A federal law should prevent the transportation of seeds of these weeds.

INDUSTRIAL HYGIENE.

Cause of Sickness and Accidents. W. I. Clark[1] says that in the Norton company plant 2 per cent. of the men are absent each month on account of sickness. During December, January and February sickness is responsible for 27 per cent. of all absences. During the winter months the proportion of cases coming to the dispensary for sickness to the number coming on account of accident is as 19 to 20.

Carelessness on the part of the workingman is the causes of 85 per cent. of accidents. Illumination is important in its relation to accidents, amount of work done and fatigue. During the first period of work, or incitement period, a moderate amount of work is done and there are many accidents. During the second period, or period of practice, there is the maximum amount of work and fewer accidents. Then comes the period of fatigue in which there is small volume of work and many accidents. Somewhere during this fatigue period there is a spurt known as the end spurt. During this spurt much work is done and there are but few accidents.

Medical Supervision. J. F. Curram[2] writes that the arguments for medical supervision in factories are these: It enables the employer to place a man at the kind of work for which he is best fitted physically. It enables the physician to advise regarding any ailments or disorders discovered. It enlists the man's coöperation

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(1) Jour. Amer. Med. Ass'n., Oct. 6, 1917.
(2) Boston Med. and Surg. Jour., Feb. 14, 1918.

in changing such habits as make minor diseases present. It prevents the introduction into the factory of men who are undesirable because of severe defects. It prevents contagious disease from entering the factory or spreading therein. It prevents the employees from being given work for which they are not fitted. The rejections are few, constituting only 3 per cent. A man found to have a major defect and yet set to work is examined every three months or oftener. Hernias, heart troubles and lung troubles are regarded as major defects.

Prevention of T. N. T. Poisoning. Hudson[3] holds that there is no great danger in the manufacture of T. N. T., but that there is great danger in its loading. The manufacture requires less labor and is done in well-equipped plants. Most of the loading is done in improvised or rapidly erected or transformed plants. Medical inspection is better carried out in the manufacturing plants. The danger of loading is not materially lessened by replacing 75 to 80 per cent. of the T. N. T. with ammonium nitrate.

The first step in the prevention of T. N. T. poisoning is medical inspection of applicants for positions. Alcoholics, mouth breathers, persons with heart and kidney diseases and persons who have recently had malaria should not be employed.

The next step is the instruction of every employee in the dangers of T. N. T. and how to avoid them.

The first symptom is a bitter taste. Inhaled T. N. T. will be tasted. Some persons develop diarrhea, more are constipated, a few vomit, a few develop eczema, a few thickening of the skin. Malaise, headache, pain in the chest and weakness of the limbs develop. If the poisoning continues the skin becomes of a yellowish pallor with cyanosis about the lips. Still later, a true jaundice develops. The name employed by the workmen for those in the yellow stage is "the canaries."

In Dr. Hudson's experience many individuals develop three or four degrees of temperature. Many develop blood changes (lymphocytosis and changes in size, shape and staining of red cells) and some old chronic cases de-

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(3) New York Med. Jour., April 20, 1918.

velop neuritis. When the urine is tested by Webster's test a T. N. T. reaction is given.

"By far the most important means of detecting the incipient cases is for the resident physician himself to make trips of inspection through the plant every day and closely observe the employees at their work. There is a peculiar facial expression and manner of carrying one's self when poisoned that can be quickly recognized by an observant man after a little experience, and our physicians pick them out without the least hesitation and send them over to the dispensary. We have so far been fortunate in catching our cases long before they have reached the stage of toxic jaundice."

When a case is recognized, the man should be required immediately to take a warm bath, during which every part of the body is scrubbed with a mixture of soft soap and sand and then he puts on an entire suit of clean clothing, especially clean underclothing. The man is given a brisk cathartic. If there is nausea, effervescing sodium phosphate is used. The men are given an abundance of warm milk. An abundance of water would answer as well, but the men prefer milk. Alcoholic stimulants are never to be given under any circumstances. Even aromatic spirits of ammonia had better be replaced by ammonium carbonate of the same strength.

What the man does when away from work is of the greatest importance. A sixteen-hour rest period can be of great service in recuperation if spent in clean, wholesome living. If spent in alcoholic indulgence and in riotous living there is but little hope that the man will escape poisoning. A shorter rest period than sixteen hours may mean an attack of T. N. T. poisoning. The men should leave work in clean clothing and well scrubbed up or else they continue to absorb poison from their skins and clothes while away from work.

Hudson recommends that employers, employees and industrial physicians read Schereschewsky (Monthly Review of the U. S. Bureau of Labor Statistics, December, 1917) and the Report of the Subcommittee on Industrial Diseases and Poisons of the Advisory Committee Council of National Defense and abide by them.

Health of Munitions Workers. W. G. Hudson and others[3] acting as a committee of the Labor Section, Advisory Commission, Council National Defense, in reporting on methods for safeguarding workers in the munitions industry against preventable diseases adopted the unique plan of consulting with both employers and employees before drawing a report and getting an agreement from the employers to abide by the report before transmitting it.

The report takes cognizance of an unusually high labor turnover and an unusually high absenteeism in these industries a part of which, though not the larger part, is due to the reputation of the industry for industrial poisonings.

The report seeks to reduce turnover and absenteeism by bringing about conditions which will prevent poisonings by removing the distrust as to the safety to health of these industries and indirectly through lessening of drink and improper amusements through weeding out of irresponsible, drifting, ne'er-do-well labor to contribute to the stability of the working force.

The greatest hazard in the manufacture of high explosives is from dust. The chemicals absorb through the skin as well as through the mucous membrane of the respiratory tract. Therefore, most of the requirements laid down in the report relate to the control of dust. The men are not required to wear face masks because these cause the face to sweat and this makes the dust more absorbable.

The importance of fumes is not lost sight of. In whatever process fumes are produced the requirement is for hoods and exhaust fans.

Medical supervision is a necessity. Not only must the men be examined when they enter employment but the physician must circulate among the men when they are at work and aid the floor boss in picking out men with the early symptoms of "canaries." The men must be periodically looked over, somewhat more formally as well.

The following groups should not be allowed to work

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(3) U. S. Pub. Health Rep., July 8, 1918.

in plants where high explosives are manufactured or loaded:

(*a*) Persons under 18 years of age.

(*b*) Persons suffering from any form of inflammation of the bladder.

(*c*) Persons addicted to the use of alcohol or nar cotics and persons under the influence of liquor.

(*d*) Persons suffering from any form of anemia.

Workers shall wear special working clothes including shoes and gloves. On leaving work at the end of the shift every worker is required to take off his working clothes, take a bath and dress in street wear. The street clothing must not be exposed at any time or place to the dust and fumes of the factory.

Aniline Poisoning. According to V. C. Baker[4] the symptoms of aniline poisoning are not well understood by the medical profession and this, taken in connection with the rapid development of the use of anilines, makes it probable that there will be a good deal of aniline poisoning throughout the country. Aniline is a highly toxic, volatile, oily substance derived as a by-product in coal-tar distillation and indirectly from benzine. Some anilines are more poisonous than others. Aniline blue is much more toxic than fuchsin. The vapor of aniline oil is very highly toxic. Aniline dyes are extensively used in the cloth industry. They are used in the leather industry. They are used to dye shoes. Furs, feathers and artificial flowers are colored with these dyes. So is wall-paper. They are used in typographical printing; also in the manufacture of rubber tires, indelible inks, hair-dyes and explosives.

The poison enters the body either by inhalation, by ingestion or through the skin. In acute poisoning, the patient may complain of lassitude, weakness, dizziness, slight dyspnea, headaches and mental confusion. There may be loss of consciousness. The lips and fingers are cyanosed; cyanosis may be general. There is frequent urination and the urine is dark and smoky.

In the chronic forms of poisoning there are frontal headaches, tinnitus, vertigo, fullness in the head, anemia,

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(4) New York Med. Jour., Oct. 27, 1917.

nausea, vomiting and diarrhea. Cyanosis is usually present. There may be considerable dermatitis.

Baker reports cases of poisoning in the following occupations: Laborer in dye factory, sorter of colored leathers, chemist in dye factory, furrier working with colored furs, housewife doing household dyeing, laborer in indelible ink factory, chemist helper in dye factory and bootblacks, printers, wall-paper hangers, painters, chemists' helpers and hair-dressers.

The treatment consists in removal to the open air. Oxygen may be given if necessary. Keep the body warm. Give hypodermic injections of camphor, ether, strophanthin or digitalis.

To prevent aniline poisoning, examine all employees before hiring and exclude those with organic disease. The workers should be instructed as to the dangers of the employment and means of avoiding them. The workers should wear rubber gloves. If there is much dust moist inhalers are advised. Inhalers do not avail against fumes. Washroom facilities should be ample and convenient. Where the danger is great, the workers should go into the fresh air four times an hour. Fans and exhausts must be used where indicated. The company must look carefully after the policing of the work room.

Prevention of Explosions. W. G. Hudson[5] writes that the explosion hazard in the manufacture of explosives is not high. Railroading has a higher hazard rate. First, explosive buildings must be widely separated. Next, the men working in a building must be limited to as few as possible. The percentage of accidents due to explosion in a factory is small. Most of the accidents are minor injuries. Investigation shows that about one-fifth of these are due to causes that could be avoided by mechanical safeguards. Four-fifths are due to carelessness on the part of the men. To avoid these, warning signs are posted, but these signs must be changed almost daily and they must be made amusing, interesting and entertaining as well as instructive. The Committee on Industrial Diseases and Poisons of the Coun-

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(5) New York Med. Jour., Jan. 8, 1918.

cil of National Defense of the Advisory Commission on National Defense adopted the unusual policy of getting the manufacturers and, as far as possible, the employees, to make suggestions as to its report before it was finally adopted. Finally, the report as adopted was agreed to by the employers. They agreed to abide by it in the absence of compelling legislation. This report was then published and circulated.

Fatigue Toxins. E. L. Scott[6] concludes that fatigue is due to the presence in tissues of chemical products resulting from wear. These substances are not specific fatigue substances, but their nature is dependent upon the nature of that tissue worn down. The bulk of the fatigue bodies are substances carrying hydrogen ions. The most abundant being carbon dioxide and lactic acid. Others are: *B*. oxybutyric acids, potassium, dihydrogen phosphate; indol, skatol and phenol are also of some importance. There is some evidence that the negative ions of lactic acid and *B*. oxybutyric acids and that certain positive ions, especially that of potassium, act as fatigue toxins. There is little probability that creatin or creatinin act as fatigue toxins. While uric acid and other purin bodies are increased by work they do not act as fatigue toxins. Nor do the negative ions of carbonic, phosphoric or sulphuric acid.

Industrial Fatigue. An interesting and valuable report on industrial fatigue made by Thomas Darlington, Frederic S. Lee and others[7] gives much advice and some information to employers and employees.

One of the best methods of estimating fatigue is to make a close, careful, analytical study of output. Another method is by study of the amount of power used. Other indices are—amount of spoiled work, the number of accidents occurring during the working day, the hours at which these accidents occur and the days of the week on which they occur.

A rise in the accident rate occurring immediately after lunch or one occurring on Monday is probably

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(6) U. S. Pub. Health Rep., April 26, 1918; Proc. Amer. Pub. Health Ass'n., 1917.

(7) Welfare Work Series No. 1, Advisory Com., Council National Defense.

due to inattention, lack of concentration while, on the other hand, a high accident rate occurring late in the day or in the latter days of the week is due to fatigue.

Still other criteria are absences from work and, at times, the sickness rate. Then there are the laboratory tests of fatigue. Some of these concern muscles, others the nervous system, the sight, the hearing and still others are dependent upon chemical tests.

Among the methods advised for the reduction of fatigue is the introduction of recess periods. It often pays to introduce several recess periods. It is sometimes best to have a single longer period. The introduction of variety in the work likewise lessens fatigue. A suggestive recommendation is that wherever possible the speed of the machine be adjusted to and in consonance with the worker's customary rhythm. "The output may be twice as great without increasing fatigue as when the speed is a little slower or even faster than this."

Omitting unnecessary motions is a method of lessening fatigue, as is also provision of adjustable seats. The ventilation of workrooms is an important aid to efficiency. Among the sanitary conditions within the factory increasing efficiency are:

1. Adequate lighting with the light properly distributed.
2. An exhaust system to remove deleterious fumes and dust.
3. Abundant cool but not cold drinking water within easy reach of the worker.
4. Attractive quiet rest rooms especially for women.
5. Lunch rooms or canteens where good warm food is supplied at cost. This gets rid of the evil influence of the saloon.
6. Clean, well-ventilated, modern toilets.

Where work is done day and night the workers should alternate between night and day work—the periods to be not less than one month in duration. As to the length of the working day the reports says: "The great preponderance of evidence favors a reasonably short working day."

Overtime is a fruitful source of fatigue and lessened production by war workers. As to Sunday work the report quotes the British report as follows: "Continuous work is a profound mistake and does not pay—output is not increased. On economic and social grounds alike this weekly period of rest is best provided on Sunday."

Bad sanitary conditions outside the factory likewise conduce to fatigue.

Boils in Factories. M. D. Shie[8] reports that in a large munition factory about 10 per cent. of the men developed furunculosis and 5 per cent. had infected wounds. It was found that all of the infections and furunculosis were in men working on lathes. Two possibilities were suggested—the oil and the cutting mixtures. Investigation showed that the cutting mixture was the source of trouble. The cutting mixtures is used over and over and becomes very foul and badly infected. The dust in the mixture contains much metal dust. The dust causes abrasions which the bacteria infect. The oil causes a little, but not much trouble. The condition was obviated by adding 1 to 1.5 per cent. of cresols to the cutting mixture.

[Hayhurst reports in a bulletin of the Ohio State Board of Health that the sterilization of cutting oils by chemicals has not proven satisfactory. He and Allbaugh advise sterilization by heat.—Ed.]

Dust Particles. T. G. Miller and H. F. Smyth[9] determined the number of dust particles, the relative size of the particles, the total weight of the dust and its division as between organic and inorganic matter in rooms in which cement making, flint grinding, steel grinding, asbestos making, pottery work, plush, carpet and blanket making, felt-hat making, silk making and cigar making was being carried on. In two analyses of country air, one indoor and one outdoor, the number of dust particles per cubic foot averaged 23,000, the size distribution was No. 1, 4 per cent.; No. 2, 50 per cent.; No. 3, 46 per cent. The weight of the dust was .0038 gms. per

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(8) Jour. Amer. Med. Ass'n., Dec. 8, 1917.
(9) Ibid. March 2, 1918.

cubic foot. The inside air was dustier than the outside. The average of three samples of city air was: Number of particles, 108,000; size of distribution, No. 1, 2 per cent.; No. 2, 25 per cent.; No. 3, 73 per cent. Weight, .0111 grains. Percentage inorganic, 34. No. 1 particles measured about 40 microns; No. 2 were in between one and three in size; No. 3 about 40 microns.

In the cement rooms the average number of particles per cubic foot was 6,790,000; distribution, No. 1, 3 per cent.; No. 2, 37 per cent.; No. 3, 60 per cent. Weight, .2185 grams. Percentage inorganic matter, 72.

In the flint-grinding industry the number of particles was 884,400; distribution of particles into No. 1, 4 per cent.; No. 2, 31 per cent.; No. 3, 65 per cent. Weight, 0.459 grams. Percentage inorganic, 76

Steel grinding—Number, 489,930; distribution, No. 1, 7 per cent.; No. 2, 31 per cent.; No. 3, 67 per cent. Weight, .0433 grams. Inorganic, 96 per cent.

Pottery industry—Number, 182,720; distribution, No. 1, 5 per cent.; No. 2, 34 per cent.: No. 3, 61 per cent. Weight, 0.0130 grams. Inorganic, 60 per cent.

Asbestos industry—Number, 494,100; distribution, No. 1, 4 per cent.; No. 2, 39 per cent.; No. 3, 57 per cent. Weight, 0.0354 grams. Inorganic, 73 per cent.

Blankets, plush, carpets—Number, 148,950. Size distribution, No. 1, 11 per cent.; No. 2, 24 per cent.; No. 3, 65 per cent. Weight, 0.0504 grams. Inorganic, 44 per cent.

Hat industry—Number, 126,020. Size distribution, No. 1, 4 per cent.; No. 2, 33 per cent.; No. 3, 63 per cent. Weight, 0.0168 per cent. Inorganic, 39 per cent.

Cigar factory—Number, 102,600. Size distribution, No. 1, 6 per cent.; No. 2, 47 per cent.; No. 3, 47 per cent. Weight, 0.0084 grams. Inorganic, 56 per cent.

Silk industry—Number, 87,000. Size distribution, No. 1, 23 per cent.; No. 2, 3 per cent.; No. 3, 74 per cent. Weight, 0.0045 grams. Inorganic, 50 per cent.

Increasing the humidity in the air increases the number of small dust particles, but decreases the total number of dust particles somewhat. The amount of dust which a worker inhales in a year in the different industries is as follows:

	Grains.		Grains.
Cement worker	45.59	Pottery worker	5.61
Carpet maker	14.20	Cigar maker	4.41
Steel grinder	8.61	Silk maker	2.43
Flint grinder	6.63	A man indoors in Philadelphia	17.96
Asbestos worker	17.19	A man outdoors in Philadelphia	10.92
Plush worker	14.85		
Blanket worker	11.67		
Felt hat maker	7.26		

Bacteria in Cigars. R. C. Rosenberger[10] studied the bacteria in 118 cigars, twenty-four of which were taken from the pockets of consumers. From each an abundant growth of bacteria were taken. There were no disease-producing bacteria in the lot in all probability. Rosenberger is of the opinion that tobacco is not an antiseptic, that any bacteria which get into tobacco live there subject to the usual limitations of bacterial life and that the habits of smoking and chewing tobacco do not protect against infection with any bacterial disease. Tobacco makers should be prohibited from moistening the ends of cigars with the mouth or tongue or with fingers moistened with saliva. Such practices are under the ban in the trade. Cigar makers should be examined as to their health, just as food producers are. While there is no great danger in biting off the end of a cigar to cut it off is safer.

T. G. Miller,[1] as the result of a study of 400 cigar workers in Philadelphia, came to the conclusion that the tuberculosis rate among cigar makers was not unduly high—not higher than in some other trades supposed to be healthier.

Moving Pictures and Eyesight. C. A. Bahn[2] is of the opinion that moving pictures do not harm the eyes. Most persons who complain that moving pictures cause ocular discomfort have some eye defect. The moving picture is, in a sense, an instrument for testing the eyes. The fact that ten million patrons daily see motion pictures and that so few complaints of eye discomfort are recorded is proof that moving picture demonstrations do not occasion much eye-strain. The seats in moving

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(10) New York Med. Jour., May 11, 1918.
(1) Amer. Jour. Med. Sci., February, 1918.
(2) New Orleans Med. and Surg. Jour., October, 1917.

picture theaters are comfortable, the house is well ventilated, the line of projection of the pictures is about the same as that of the observers' sight, the nearest seat is more than 20 feet from the screen and the projection and the picture are based upon proper optical principles. All of these features operate to make the moving picture performance healthful, rather than otherwise. The sight mechanism requires one-twelfth of a second to record. The moving picture mechanism projects sixteen pictures a second on the screen. Each picture is thrown on the screen, comes to a dead halt, is then replaced by the next picture. The light is turned off while the change is being made. If the picture is unsteady, if it moves while the light is on, if it moves faster or slower than sixteen pictures a second, the moving picture will be trying on the eyes, but modern picture machines control all these points well.[3]

Poisoning by Automobile Gases. W. C. Wood[4] would proteet those who tinker with their automobiles in closed spaces by boring a hole 3 inches in diameter through the garage door and running a detachable pipe from the automobile exhaust outlet through this hole to the outside air.

Illumination Standards. L. B. Marks[5] contends that better lighting of factories would reduce accidents, decrease spoilage, lessen eyestrain, lessen fatigue and tire and increase production.

When adequate and satisfactory illumination is substituted for the all too prevalent poor illumination in factories, mills and other work places the results obtained are mutually beneficial to the employees, employers and the country as a whole. Under proper illumination conditions the health, contentedness, safety and skill of the employees are maintained at a high standard, the output is increased in quantity and improved in quality while there is a proportional reduction in the cost of each unit of finished product when it reaches the public.

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(3) Practical Medicine Series, 1918, Vol. III., p. 27.
(4) Med. Record, Dec. 22, 1917.
(5) Amer. Jour. Pub. Health, May, 1918.

committee of the Committee on Labor of the Council of National Defense, introduce their code of lighting for factories, mills and other work places. Among the features of the code as recommended are the following intensities required:

	Foot-Candles at the Work.*	
	Ordinary Practice	*Minimum*
(a) Roadways and yard thoroughfares	0.05 — 0.25	0.02
(b) Storage spaces	0.50 — 1.00	0.25
(c) Stairways, passageways, aisles	0.75 — 2.00	0.25
(d) Rough manufacturing such as rough machining, rough assembling, rough bench work	2.00 — 4.00	1.25
(e) Rough manufacturing involving closer discrimination of detail	3.00 — 6.00	2.00
(f) Fine manufacturing such as fine lathe work, pattern and tool making, light colored textiles	4.00 — 8.00	3.00
(g) Special cases of fine work, such as watch making, engraving, drafting, dark colored textiles	10.00 — 15.00	5.00
(h) Office work such as accounting, typewriting, etc	4.00 — 8.00	3.00

*The foot-candle, the common unit of illumination, is the lighting effect produced upon an object by a standard candle at a distance of one foot; at two feet, the effect would be not one-half foot-candle, but one-fourth foot-candle, etc. A lamp which would give off 16 candle power uniformly in all directions would produce a uniform illumination of one foot-candle at a distance of four feet in any direction.

Note: Measurements of illumination are to be made at the work with a properly standardized portable photometer.

In that section of the report dealing with natural illumination the statement is made that sunlight, however desirable it may be from the standpoint of sanitation and health, is not the best light from that of illumination. It is too concentrated and too intense and too
With these statements L. B. Marks and others,[6] a
variable. Certain processes can only be carried on at north windows in factories naturally illuminated because of the shortcomings of direct sunlight.

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(6) Welfare Work Series No. 3, Advisory Commission, Council National Defense.

[As is the case with most committee reports the text is already concentrated to the maxium and abstracts can not adequately carry the meaning. It is recommended that those who are interested secure copies of this report.—ED.]

Compressed-Air Illness. S. Erdman[7] advocates the following among other provisions for a law for the prevention of compressed-air illness:

1. All tunnels and caissons to be connected by telephone with the compressor plant.
2. The hospital lock to be furnished with a glass port.
3. No person over 40 years of age who has not previously worked in compressed air shall be allowed to commence work under pressures above 20 pounds.
4. No person who is over-weight shall be permitted to commence work in compressed air.
5. No alcoholic beverages to be allowed on the premises.
6. Men to be furnished hot coffee on completion of shifts. The necessity is for a proper rate and time of decompression. These must be so adjusted that the residual saturation of the tissues upon emerging from the locks shall not exceed 25 pounds. If this caution is observed the laborers may have pains in the joints, but they will not be in serious danger.

In pressures between 30 and 35 pounds the real incidence of serious and fatal cases begin to appear.

The amount of pressure should never be allowed to pass 50 pounds. That is the limit of human endurance. The length of exposure is determined by the degree of pressure being in inverse relation thereto.

Mustard Gas. Mustard gas, or dichlorethyl sulphide, was first used by the Germans on a large scale at the battle of Ypres, July 12 and 13, 1917. A. Giraud[8] says that the eye lesions due to gassing by mustard gas develop within from six to twelve hours and fully developed within forty-eight hours. The respiratory affections usually appear at the end of from two to four days.

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(7) Amer. Jour. Pub. Health, June, 1918.
(8) Jour. de méd et de chir. prat., Nov. 25, 1917.

The skin lesions fall into two groups, those which come about the time of the conjunctivitis and those which come from five to twelve days later.

A. S. Warthin and C. V. Weller,[8] having studied the histology of the skin lesions of mustard gas poisoning, say that a slowly progressive necrosis is characteristic. The necrosis reaches its height from five to ten days after the application of the poison. The lesions are painless. The burn differs both from a heat and an electrical burn. The admixture of water does not make the burn worse, except that water puts some of the oil in solution.
Others are: *B.* oxybutric acids, potassium, dihydrogen was being carried on. In two analysis of country air, tion was No. 1, 4 per cent; No. 2, 50 per cent.; No. 3, cent.; No. 2, 2.37 per cent.; No. 3, 3.60 per cent. Weight, 7 per cent.; No. 2, 31 per cent.; No. 3, 61 per cent. 3, 65 per cent. Weight, 0.050 grams. Inorganic, 44 per 1, 23 per cent.; No. 2, 00 per cent.; No. 3, 74 per cent.

The best studies of poisoning by mustard gas, dichlorethyl sulphide, of which I know are those by A. S. Warthin, C. V. Weller and G. R. Hermann.[9] The gas produces a progressive inflammation of the conjunctiva or of the skin if it managed to touch that part of the body. Burns of practically every part of the body are encountered but the buttocks and genitalia are especially prone to burn. For some reason, perhaps because of the protective action of tears, the skin burns worse than does the conjunctiva.

The treatment of skin burns consists of: Immersion for from one-half to two hours in Dakin's solutions, 0.5 per cent. hypochlorous acid. If the wet treatment can not be carried out dichloramin T. in chlorcozane or chloramin T. in sodium stearate may be used. This neutralizes any gas left in the tissue, sterilizes and at the same time is of direct therapeutic advantage. After the Dakin bath, use a 5 to 10 per cent. solution alternating with Dakin's, for instance: Dakin, 1 to 2 hours—5 to 10 per cent. solution salt, 2 hours, physiologic salt solution 1 hour. At night use a vanishing surgical cream such as chloramin T. in 1 per cent. sodium stear-

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(8) Jour. Lab. and Clin. Med., May, 1918.
(9) Ibid, October, 1918.

ate. Where there is much pain use the colloidal saline bath. Dissolve 1 pound commercial sodium bicarbonate in from 20 to 30 gallons sterile physiologic salt solution at a temperature of 90° to 95°F. Leave the patient immersed in this for from 15 minutes to 48 hours. Use in the eyes 0.5 per cent. dichloramin T. in chlorocosane and also cold compresses of saturated boracic acid.

Poisonous Gases. Victor C. Vaughan writes editorially[1] of the uses of poisonous gases in the present war. Although the use of poison gas is prohibited by the Hague Convention the Germans began its use at Ypres in 1915. The nature of the gas was diagnosed at once and advice as to gas masks was given by C. G. Nasmith ("The Fringe of the Fight"). Poisonous gases are divided into (1) those which are directly and immediately poisonous; (2) those which produce slow death by asphyxiation; (3) those which put the victim out of action without doing permanent harm.

In the first class are hydrocyanic acid, sulphide of hydrogen and phosphide of hydrogen. In the second class are chlorine, oxychloride of carbon known as phosphgene, acroleine, bromacetone, chloropicrine, methyl chloride of chloroform and methyl chlorosulphate. In the third class are bromoacetone, iodacetone, bromacetic ether and iodacetic ether. This group produce an abundant flow of tears and thus temporarily disable.

Poison gases are used in waves, hand grenades and in shells. Liquid fire is allied to poison gas.

A formula for a neutralizing solution to be used on gas masks, portierres, on doors or elsewhere is:

Water	1,000
Hyposulphite of soda	220
Carbonate of soda, Solvay	175
or	
Crystalline carbonate	475

Sanitation of Rural Workman's Areas. One of the committees appointed by the Labor Section, Advisory Commission, Council of National Defense, dealt with the sanitation of rural workmen's areas. The report made by G. M. Kober and others[2] deals with areas occupied by erection camps, newly established industrial plants and their residence areas and rapidly enlarged existing institutions. It furnishes but little for guidance in housing labor for large industrial plants located in cities.

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(1) Jour. Lab. and Clin. Med., October, 1917.

The necessity for safeguarding the water supply is not only discussed on general principles but detailed plans and specifications are given.

Another greatly neglected subject in most of these communities is the collection and disposal of excreta which is discussed in detail. It is a common experience with such communities that epidemics of preventable disease sooner or later lays them under tribute. Epidemics of typhoid play a prominent rôle in their trials. If the advice of this committee is carried out such communities should be reasonably free from typhoid. One great munitions plant, the DuPont company, not only carries out the requirements of this committee in their newly erected industrial villages located in connection with explosives factories but recognizing the hazard to quantity production from smallpox and typhoid they refuse to employ any one who has not been recently vaccinated against smallpox and typhoid fever.

The report advises as to housing, as to material, construction, architecture and maintenance.

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(2) U. S. Pub. Health Rep., Sept. 6, 1918.

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